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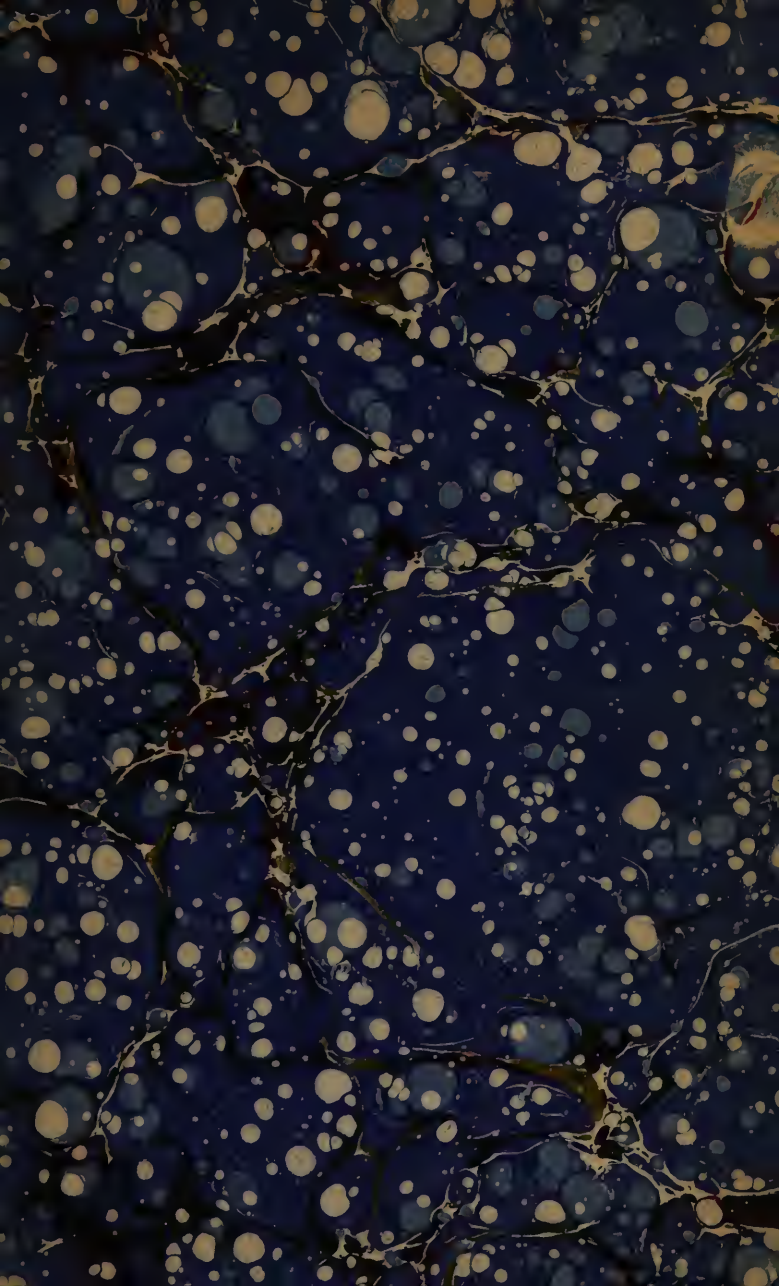
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AMERICAN RED CROSS
ABRIDGED
FIRST AID TEXT-BOOK

GENERAL EDITION

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AMERICAN RED CROSS ABRIDGED TEXT-BOOK

ON

FIRST AID

GENERAL EDITION

A MANUAL OF INSTRUCTION

BY

COLONEL CHARLES LYNCH

MEDICAL CORPS, UNITED STATES ARMY

Prepared for and Endorsed by the American Red Cross

SECOND EDITION

WITH 41 ILLUSTRATIONS

PHILADELPHIA

P. BLAKISTON'S SON & CO.

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PREFACE TO SECOND EDITION

This is an abridged edition of the American Red Cross Text Book on First Aid and Relief Columns, and in common with that book has been re-written and brought up to date.

The purposes of the First Aid Department of the American Red Cross are announced to be as follows:

1. The formation and conduct, through Red Cross Chapters, of classes for instruction in Accident Prevention and First Aid to the Injured among men and women in all communities and in every industry.

2. The creation of a volunteer reserve force of men, trained in First Aid to the Injured, who will be qualified for duty with any Red Cross organizations formed for service with the armed forces of the United States in time of war.

3. The creation of a sanitary reserve for the Army and Navy, through the formation of Sanitary Training Detachments and instruction in the duties pertaining to the sanitary services of the Army and Navy.

4. The stimulation of interest in and encouragement of proficiency in First Aid methods through the promotion of First Aid contests.

5. The preparation of up-to-date books and other literature on First Aid and the designing and standardization of First Aid materials.

6. Cooperation with other organizations in the dissemination of information on Accident Prevention and First Aid methods.

It is believed the present manual will continue to find a place in the carrying out of these objects. Experience has shown that the different Red Cross First Aid classes desire different books. That is to say, while first aid must always be the same, it is more convenient for each class to have a book which gives what it specially needs, and in which other first aid information is omitted.

This edition then, like its predecessor, is for *general* use.

PREFACE TO FIRST EDITION

GENERAL EDITION

This edition is one of a series which are being published under the auspices of the American Red Cross on the subject of First Aid to the Injured. The body of all these editions will be identical, as the most essential facts in respect to first aid are the same, but in order to adapt each to the needs of the particular class for which it is designed appropriate chapters have been added to the body of the book for each edition.

The industrial edition which has already been published is better adapted to the special needs of workmen in that field and its use for them is advised. This edition is for *general* use

As the experience of the author increases in first-aid instruction he is more and more convinced of the benefits to be gained therefrom and impressed with the fact that anyone of ordinary intelligence can learn how to administer first aid if he seriously desires to do so, and the subject is well taught. This serious purpose must be furnished by the student and it is hoped the present manual fills its mission in teaching as well as may be. As is the case with most practical subjects, however, a good teacher is highly desirable if not absolutely essential; and the services of such a teacher should be obtained by every class when practicable.

The American Red Cross is prepared to arrange for the examination of first-aid classes on the conclusion of courses of instruction on this subject. Successful candidates may obtain certificates of proficiency of that association. Similar examinations are held by the Y. M. C. A. which grants a combined certificate with the Red Cross. Full information in regard to these matters may be obtained from the First Aid Department, American Red Cross, Washington, D. C.

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INTRODUCTION

Certainly, we as a people have never been deaf to the voice of suffering, and this is really the reason first aid has made such progress in our country. Thousands have studied it because they realized the knowledge acquired would enable them to help someone. This must always be the case whether we are at peace or at war. But now we have still another incentive. Never in the history of our country has its man power been more important than it is today. And in man power is included every man, woman and child in the land.

Before the war this was not so apparent. Then wastage, while never justified, did not mean possible national disaster, with the loss of our ideals, and of all we hold most dear. Now we realize that this is no longer the case. We are engaged in a struggle in which we cannot afford to waste anything.

How necessary it is for us to save food as well as other things has been brought home to us, and we have already accomplished a great deal in this direction. What about human wastage—Is this less important? Quite the contrary. And what are the facts regarding our wastage of our fellow beings? Within the last few years better knowledge of the causes of many diseases has enabled us to reduce deaths from them to a very great extent. For example, take the most common disease, tuberculosis or consumption, exact knowledge of how it is spread, general instruction in the subject, and better treatment have reduced deaths from it about one-half. It is even supposable as time goes on many diseases will be so well understood that they will be banished from our midst. With the prevention of disease it would seem that every year many more persons should die only of old age, and this is the case. But with the lessened number of deaths from disease, are deaths from violence also less? No.

In time of peace accidents have been costing us nearly 100,000 lives annually, and the injured in accidents, some of them being made cripples for life, have exceeded the dead by hundreds of thousands. Five times as many people as are killed are said to be injured to so great an extent that they can no longer earn their living. Without taking into account the suffering and sadness brought into thousands of homes through these accidents, and these cannot be measured in dollars and cents, computing the earning power of the injured at the low rate of \$500.00 per annum, gives the aggregate loss in wages of \$250,000,000.00 annually, nor does this include the loss involved in the charges for medical care, the expenses incurred by legal claims and damage suits, or the expense to employers.

We have then been conducting a bloody war within our own boundaries, while engaged in the ordinary commonplace pursuits of peace. Going into this matter in more detail: On the railroads between 1888 and 1907, 153,336 people were killed, and 1,042,486 were injured. On the steam railways of the United States for the year ending December 31, 1916, there were 206,723 casualties; of these 10,001 were deaths. In the coal mines of the United States 2226 men were killed in 1916. While figures are not available to show the number of injured in our coal mines, we know that we employed 720,971 men in them, and in Great Britain 150 out of every thousand of their miners were injured during 1914. Probably as our death rate is higher in the American mines, our non-fatal injury rate is also higher. Conditions were not better in our quarries, 15 per cent. of the quarrymen employed being killed or injured during the year 1916. The lumber industry is also a dangerous one. During five months in 1914, 63,350 men were employed in lumbering in the State of Washington. In this short time there were nearly 5000 accidents. In 1913 it is estimated that approximately 15,000 deaths were caused by street car, automobile and other vehicle accidents, by lightning, and electric shock, and by drowning. Probably this is an under-estimate, as we know that drowning alone is responsible for at least 7500 deaths per year. Nor are our homes free from accidents. On the contrary, the

Travelers' Insurance Company reports that for the year 1917 nearly 28 per cent. of the total number of claims paid for accidental injuries (not including industrial), were for injuries received in and about the household, the number being considerably larger than for any other class of accidents. During 1915 in Cook County, Illinois 105 children were fatally scalded or burned; in the same year in New York City 179 persons were killed by fires resulting from matches, lamps, candles, bonfires and explosions. Investigation of 29,684 accidents by the coroner in Chicago, covering a period of eleven years, showed that 15,241 of them were household accidents. During 1916 falls on stairways in the house caused the death of 1149 persons and crippled more than 4000 others.

The loss from accidents once being realized it is certainly good judgment to try to take the necessary steps to prevent, or at least notably to reduce such loss. This is a subject to which our Red Cross has given a great deal of careful thought. The methods for the prevention of accidents, and for their relief when they occur, fall naturally under the following heads:

1. Education of the public.
2. Installation of safety devices.
3. Instruction in first aid to the injured, and in accident prevention.

Without minimizing their importance in any way, we may pass over the first two subjects here. It should be clearly understood that the first object of first aid instruction is to prevent accidents by educating the individual to use what care may be necessary in the special circumstance; then too prompt treatment is in itself a measure of prevention, for if the right thing is done quickly, the injured person is at once put in condition so the services of the doctor can be made of the most value. Study of first aid is of great practical value not only to the individual, but to the public at large. The extensive experience of the Red Cross has demonstrated that the accident rate among miners who have been instructed in first aid and accident prevention, is 75 per cent. less than among the uninstructed.

Just as with tuberculosis, study of the methods of preventing

accidents will well repay the effort. It will be noted that in speaking of tuberculosis it was stated that better treatment was one of the factors which had operated to lessen deaths from this disease. Better treatment is equally effective in accidents. In disease this treatment is practically always given by a doctor as it always should be. Is this the case in accidents? Certainly the services of a doctor are always demanded except for trivial injuries, but the vast majority of accidents occur when no doctor is on the spot—then if you know what to do and what not to do you can save a life or make the effects of the injury much less severe. General knowledge of how to prevent accidents can be made just as effective as general knowledge of how to prevent disease; and good treatment of the injured is as important as good treatment of the sick. Moreover, for the early treatment of injured a doctor is often not available, and so first aid plays an important part.

From what has been said it should be clear, then, that we are wasting human lives and physical fitness at an appalling rate through accidents and injuries. And that it is possible to remedy this to a considerable extent through knowledge of accident prevention and first aid to the injured. Furthermore, while we have a duty in this respect at all times, there is more than ever an insistent call at present on account of the World War.

AMERICAN RED CROSS ABRIDGED TEXT-BOOK ON FIRST AID

GENERAL EDITION

CHAPTER I

WHAT FIRST AID TO THE INJURED IS

First Aid to the Injured is what is done for injured and ill in case of emergency.

The wish to be helpful does not necessarily imply the ability to be so, however. No, for this special knowledge is necessary, and this is what this little book attempts to give, so far as may be. What one must learn in order to practise first aid to ill and injured successfully, is not only what to do but what *not* to do.

Neither can one be helpful in giving first aid in case of need unless he combines his knowledge of the subject with the exercise of common sense. Then, too, practice is necessary. One might know every word in this book, and if, at the same time, he had not practised the lessons he had learned, he would be quite at a loss in an emergency.

Semi-proficiency in first aid is more dangerous than semi-proficiency in other subjects, for we are dealing with human beings, and what we do or fail to do may make or mar a human life.

First aid then demands of you the very best you can bring to it. There are some first aiders to whom we would entrust ourselves

with every confidence, and a few, unfortunately, to whom we could not. Certainly you will want to belong to the former class. You can do so, without question, if you learn first aid, practise its lessons, and at the same time govern your actions by good sense.

We all know, of course, that doctors, as they give years to study of their profession, are best qualified to take care of ill and injured. On the other hand, doctors are often not on the spot, and this is going to be more and more the case as the Great War's demands on the medical profession become greater and greater. When the services of a doctor cannot be promptly obtained, the necessary delay may result very disastrously, unless something is done. This is where the first aider steps in.

Knowledge of first aid to the injured will not only enable you to serve your fellows. It is also a very valuable and very cheap form of insurance. Possibly we may never need this knowledge, but the wise man or woman would hardly be willing to let any building go without insurance on the chance that it would never burn. How much more important it is for us to insure ourselves, our families and our friends against the bad results of accidents through knowledge of first aid to the injured.

There is no clashing of interest between the doctor and the first aider. The duties of the former begin when the latter leave off. Knowledge of first aid enables trained persons to put patients into doctors' hands in the best possible condition for cure. It should also enable them to recognize the severity of an injury or illness so that when necessary they may call a doctor promptly. Treatment, except of minor cases of injury or illness and the care of injured and ill in an emergency till a doctor can be procured is not first aid. Such treatment cannot be learned from this book, and cannot be too strongly condemned.

Perhaps sometime you may be so situated that you must go beyond first aid. The chances are about a thousand to one that this will never really occur, but suppose it does—what should you do? Stick to your first aid just the same, and get the person you are taking care of into the hands of a doctor as soon as possible. This is far, far better than to go further and very

likely thus do more harm than good. Very likely, too, first aid would have been all that the doctor would have done under similar circumstances. The more delicate and difficult surgical procedures are not for the roadside or the unprepared room, but only for the well-equipped hospital and operating pavilion.

You will admit that where a question of property is involved, you want the services of a skillful lawyer. Even more you need the services of a skillful doctor, when it is a question of your life or health. It has been well said that he who acts as his own lawyer has a fool for a client. A man is twice a fool, who, without a doctor's training thinks himself competent to care for the very complicated machine—the human body.

First aid does not teach this, but it does teach how to prevent the worst effects of injury and illness through simple, prompt measures, which any intelligent person can learn.

There is another very important thing which first aid teaches.

Every injury described in this book should suggest how the accident which caused it might have been prevented. Still more, if any first aider cares for a real injury he or she should think over the cause for it carefully and so far as within their power take steps to prevent a similar accident in the future.

QUESTIONS

1. What is first aid?
2. What is necessary in order that you may practise first aid successfully?
3. What are the relations of the first aider and the doctor?
4. How far should first aid go?
5. What relation has knowledge of first aid to the prevention of accidents?

CHAPTER II

STRUCTURE AND MECHANICS OF THE BODY

A workman, in order that he may repair his machine, must know exactly how it is made and how it operates. This is exactly the knowledge which a surgeon should have of the human body. The latter is such an extremely complicated mechanism, however, that months and years are needed to acquire such knowledge. Fortunately, it is not necessary for the first-aid student to go so deeply into these subjects. His efforts to relieve suffering will be confined to emergency treatment. To render this intelligently it is necessary to know comparatively little of anatomy and physiology or, in simpler language, of the structure and mechanics of the human body.

In this chapter will be found all facts on these two subjects which are essential for the student of first aid. But even the comparatively simple anatomy which he must know cannot be learned from books alone. What is said here should, therefore, be added to by careful study of the skeleton, and of the form of its more important bones and of his own body or, better, that of a comrade. Thus the positions and relations of the more important structures may be clearly pictured in his mind. Good charts may also be made of considerable assistance to him. The services of a competent teacher, while perhaps not indispensable, must always prove of great value.

The subjects of this chapter and those of the next two, while essential, are very dry and difficult for the beginner, and it is suggested that the student be not required to memorize them at first, but that he run rather hurriedly over them, returning to them again and again in connection with practical work in caring for supposed accident and emergency cases.

THE BODY

The body is composed of hard and soft parts. The bones are the hard parts and the skin, the muscles and the internal organs, such as the heart, lungs, liver, etc.,—constitute the soft parts.

THE COVERING AND LINING—SKIN AND MUCOUS MEMBRANE

The skin affords the covering for the entire body. Under it is a fatty layer, the padding, which assists it to prevent the escape of the body heat which is produced by chemical processes in the interior of the body.

One of the most important parts played by the skin is to act as a defense against the introduction of germs into the tissues of the body. Germs cannot pass through the unbroken skin, and any injury which is accompanied by a break in the skin makes a breach in this defense and is therefore much more serious.

At all points where openings occur in the surface of the body, such as the mouth, nose, etc., the character of the covering changes as soon as it becomes internal instead of external. Take the cavity of the mouth, for example, it is easy to see that its lining is much thinner and more delicate than the skin. This is characteristic of the lining of all the cavities of the body which communicate with the air. Such cavities are the digestive tract, the respiratory tract, etc., etc. This lining membrane is called the Mucous Membrane. While poisons are not absorbed through the skin at all, absorption through mucous membrane is rapid. This is also the common route of all disease germs.

THE FRAME-WORK—BONES

The Bones, 202 in number, are hard and firm and together make up the Skeleton.

The Skeleton forms a strong and rigid frame-work for the body, supports and carries the soft parts, protects vital organs from injury, gives attachment to muscles, and forms joints so that movements are possible.

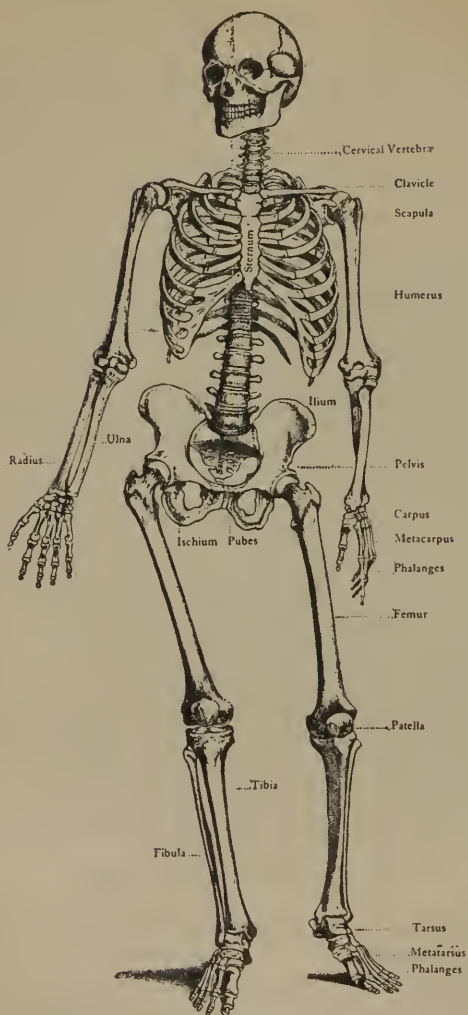


PLATE I.—The skeleton. (*Holden.*)

The body is divided into three parts:

1. **The Head**, made up of the Cranium, a bony case which encloses and protects the brain; and the Face, with the eyes, ears, nose and mouth. The only movable bone in the head is the lower jaw.

2. **The Trunk**, which is divided into two parts by a muscular partition—the diaphragm. The upper portion is the Chest, which contains the esophagus or gullet, the lungs, the heart and some large blood-vessels. The lower portion is the Abdomen, in which are found the stomach, liver, kidneys, bladder, the intestines and other organs.

The trunk is formed of several bones which are of interest to the first-aid student.

The Spinal Column, a strong pillar with several curves, is made up of a number of bones called vertebræ with a softer substance called cartilage between them. At its lower end, the spinal column terminates in the broad Sacrum or Rump Bone and the pointed Coccyx. The spinal column is hollow and contains the spinal cord, a continuation of the nervous substance of the brain. The spinal column supports the head and the ribs, and is itself supported on the pelvis.

The Ribs, 12 in number, form the greater part of the walls of the chest. All the ribs are connected to the spinal column behind, but the two lower ones on each side are shorter than the others and are not connected to anything in front. The 10 upper ones on each side are united to the Breast bone.

The Breast-bone or Sternum is a flat, dagger-shaped bone about six inches long which forms the front of the chest. Above it forms joints with the Collar-bones, being notched for the purpose on each side.

The Pelvis is a wide, strong, bony basin formed of the Haunch bones (ilia) at the front and sides and partly behind where it is closed by the sacrum and coccyx. It supports the trunk and forms joints with the lower limbs.

3. **The Extremities** Comprise the 2 Upper and the 2 Lower Limbs. Each upper limb is made up of the Scapula or Shoulder-blade, a flat, triangular bone at the back of the shoulder; the

Clavicle or Collar-bone, a curved long bone placed horizontally across the upper part of the chest above the first rib; the Humerus, the bone of the upper arm; the Radius and the Ulna, the two bones of the forearm; and the Hand, which has 8 small, irregular bones in the Carpus or wrist, five Metacarpal Bones for the hand itself, and 14 bones in the fingers and thumb.

Each lower limb is made up of the Femur or Thigh-bone; the Patella or Knee-cap; the Tibia and Fibula, the two leg bones; and the Foot. The foot is made up of the Tarsus; the instep with seven irregular bones; 5 Metatarsal Bones for the middle of the foot; and the toes with 14 bones.

The principal interest which bones have for the student of first aid is that they may be broken or fractured, one of the commonest accidents. (See Fractures, page 73.)

JOINTS

Wherever two bones are in contact or touch each other they form a joint. The ends of bones forming a joint are covered with a smooth substance called cartilage or gristle, so that they may move without friction on each other. Joints are hermetically closed by a flexible sac, the capsule, which secretes an oily fluid. This fluid lubricates a joint just as oil does an engine. The ligaments of a joint are strong, fibrous bands which may themselves form the capsule or may be separate from it. The most important joints to study are the hip and shoulder, which are ball-and-socket joints having movements in all directions as well as rotary movements, and the elbow, wrist, knee and ankle, hinge joints. These have only to and fro movement like an ordinary hinge.

Joints are of importance to the student, as bones are liable to be put out of place or dislocated at the joints. (See Dislocations, page 69.)

MUSCLES

The movements of bones at the joints are caused by the Muscles, of which there are about 400.

The muscles, the flesh or meat, form two-fifths of the body by

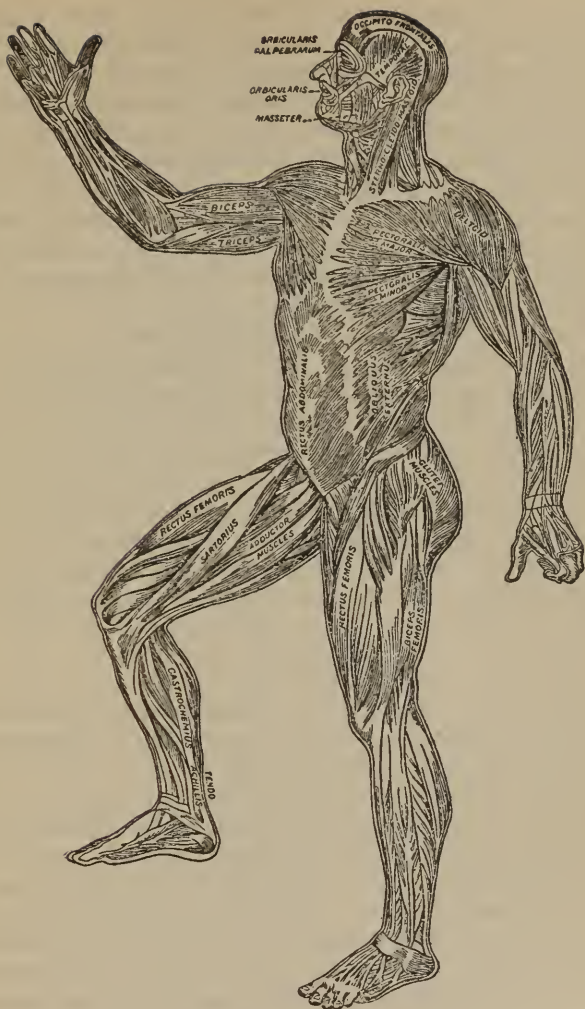


PLATE II.—The muscles. (*Brubaker.*)

weight. They are made up of red fibres which have the power of shortening or contracting, so that if one end of a muscle is fixed and the muscle is contracted the other end will pull on and move whatever it is attached to. By doing this muscles cause all the movements of the body. For example, the biceps, the big muscle at the front of the upper arm, by contracting causes the elbow joint to bend by bringing the forearm closer to the upper arm. All muscles are somewhat on the stretch, as otherwise prompt movement would be impossible. Some of the muscles are attached to bones by Tendons or sinews. These are strong, fibrous cords. They may be well seen in the wrist.

Muscles are of two classes: Voluntary muscles, such as those of the arm and leg—these are under the control of the will; and Involuntary muscles, such as the heart—these work independently of the will. By this wise provision of Nature all vital processes go on without our being compelled to give any thought to them.

Voluntary muscles are of prime interest both in fractures and in dislocations, as their pulling causes displacements and their resistance offers the chief obstacle to setting fractures and to reducing dislocations. (See Fractures and Dislocations, pages 73 and 69.)

CIRCULATION

The Heart.—In order that the blood may reach all parts of the body it is, of course, necessary that some force shall propel it. This is provided by the Heart, which is not the seat of the feelings, but a most skillfully devised pumping machine.

The heart is about the size of a man's fist and is located in the chest between the lungs. It is a hollow, muscular organ, with valves which close and prevent the blood from flowing backward, all its force being expended to send the blood forward. The beat of the heart which we feel in the chest is its contraction by which it is made smaller inside, thus forcing the blood to the furthest parts of the body. After the heart contracts it dilates or becomes larger inside and the valves open so that it may fill with blood. The next contraction again forces the blood forward, and so on as

long as a person is alive. Its action may well be compared to the bulb of an atomizer.

The heart contracts usually about 72 times per minute.

While, as has just been stated, the heart is a pump, it is not a single but a double pump, being divided into two entirely separate halves by a muscular partition. The left side of the heart, or the left pump, drives the blood through the body, back to the right side of the heart and the right side drives it through the lungs alone and then to the left side of the heart.

Blood-vessels.—A series of closed tubes, or blood-vessels, as they are called, carry the circulating blood. They are of three classes: 1, Arteries; 2, Capillaries, and 3, Veins.

1. **Arteries.**—Leaving the left side of the heart is the largest artery of the body—the Aorta. This strong tube is just about large enough so that a man's thumb may be introduced into it if it is separated from the heart. It soon divides into branches which again branch and rebranch, the individual branches constantly growing smaller in size, to reach finally the furthest parts of the body. It should be remembered, too, that the smaller branches of the arteries join freely with one another. The blood passes from the heart to the aorta and thence to the smaller arteries, not in a steady stream but in waves, each of which is produced by a contraction of the heart. The beat these waves causes the Pulse, which may be felt not only at the wrist and temple, but also anywhere else an artery is near enough the surface of the body. Naturally, if an artery is cut, there will not be a steady stream flowing from it, but the blood will be expelled in spurts or jets. The walls of arteries, especially those of large calibre, tend to remain apart when divided.

As the course of the blood in the arteries is away from the heart toward the extremities and the head, if an artery is cut, in order to stop the bleeding the artery must be compressed either on the side of the heart or on the bleeding point itself. Pressure on the further side of the cut will, as may be easily understood, do no good so far as stopping bleeding from an artery is concerned. It is also necessary to press on the artery on the near or heart side as close to the bleeding point as possible. This is because arteries

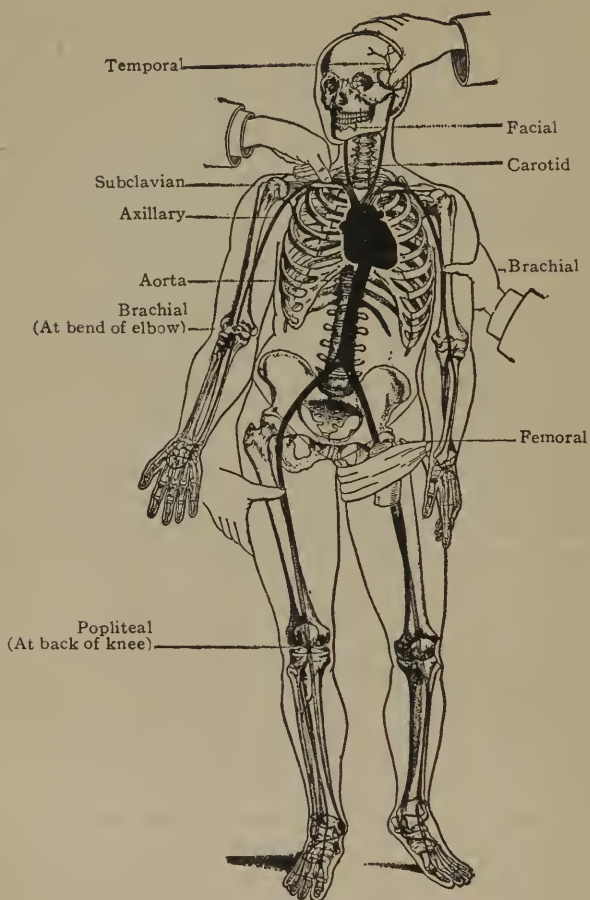


PLATE III.—The arteries and pressure points.

in their branching and re-branching join each other, and if pressure is made on an artery far above the bleeding point, so many branches may bring blood into it between the point of pressure and the bleeding point that a great deal of blood will be lost, notwithstanding the fact that the main branch is blocked by pressure at a distant point. However, it is not in every part of the body that arteries lie near enough to the surface to be compressed in their course. Moreover, it is necessary in compressing an artery to select a point where a nearby bone gives a hard surface to press against. Therefore, the student of first aid must know, first, the situation and course of the principal arteries and, second, the points on which to exert pressure.

Without going into details, the aorta may be said to have three great branches which are of particular interest to the student of first aid. One of these, the Carotid, supplies the head and neck with blood; the second, the Subclavian, the upper extremity; and the third, the Femoral, the lower extremity.

The table which follows gives certain necessary information regarding these arteries and their branches.

Arterial bleeding is always most serious, because blood thrown out in jets from the cut artery with each contraction of the heart is rapidly lost. The blood which spurts from an artery is always bright red in color, as arterial blood has not yet lost the characteristic bright red of the oxygenated blood from the lungs.

2. Capillaries.—The arteries, as they go further and further from the heart, become very small and thin-walled, till they finally terminate in still smaller vessels which are called capillaries, from the Latin word meaning a hair. The capillaries form a delicate net-work of vessels everywhere, and give the rosy color to the skin. Slight pressure on the skin will cause a white spot to appear. This is because the pressure has forced the blood from the net-work of capillaries and the white skin is seen instead of the rosy color due to the presence of the blood in the capillaries. In capillaries the pulse, or contraction wave from the heart, is no longer apparent, as these fine, hair-like tubes break up the waves. Slight cuts or pricks of the skin are sufficient to divide some capillaries and therefore to cause bleeding. Naturally, on account of

HEAD AND NECK

Artery	Course	Point on which to make pressure
Carotid.....	From upper, outer edge of breast-bone to angle of jaw.	Deep. Down and back, an inch to the outer side of Adam's apple.
Temporal (a branch of carotid).	Upward, one-half inch in front of ear.	On skull, immediately in front of upper part of ear.

UPPER EXTREMITY

Subclavian.....	Across the middle of first rib to arm pit.	Deep. Down and back over center of collar-bone on first rib. Shoulder should be drawn down first.
Brachial (a continuation of the subclavian).	Descends along inner side of big muscle at front of upper arm; about line of seam of coat, to just below center of crease at bend of elbow.	Against bone of upper arm by grasping and pulling big muscle to outer side. Or at elbow by putting a tight roll of cloth or a rolled bandage in bend of elbow, and bending up arm as much as possible.

LOWER EXTREMITY

Femoral.....	Down thigh from pelvis to knee, line from middle of line between point of hip and center of pelvis in front to inner side of knee.	Against bone of thigh high up inner side in line given about three inches below upper end of line.
Popliteal (a continuation of the femoral).	Down in middle of space at the back of knee-joint.	In bend of knee as described for elbow.

2. Bleeding from a Large Vein



1. Bleeding from Capillaries



3. Bleeding from an Artery



PLATE IV.—Bleeding.

the minute size of these vessels, bleeding from them, except from a very large surface, is not dangerous to life. Capillaries branch so freely that pressure used to check capillary bleeding, to be effective, must be made on the bleeding point. The blood lost from capillaries is no longer bright red in color like that from arteries, but is somewhat darker.

3. **Veins.**—The blood-vessels which return the blood to the heart from the points furthest from it are called veins. They may be easily recognized as the blue lines under the skin. Everywhere many capillaries unite to form minute veins, these unite to form larger veins, and finally these vessels become very large before entering the right side of the heart. The best known of the large veins is probably the jugular vein of the neck. Bleeding from a cut vein is in a continuous flow instead of in jets, as is the case with bleeding from arteries, and it is mainly through this difference that one distinguishes venous from arterial hemorrhage. Venous blood, too, is dark, bluish-red in color, as the oxygen in the blood stream is lost in its passage through the capillaries. While bleeding from veins has not the almost terrifying appearance of arterial bleeding, a dangerous amount of blood may be lost from a large vein. As the course of the blood in the veins is toward the heart, in stopping bleeding from them pressure must never be made on the side toward the heart but on the bleeding point or on the side away from the heart.

The Blood.—The Blood is a fluid which carries properly prepared food, oxygen, and heat to nourish and warm all parts of the body, from which it also removes waste materials for final expulsion. These processes go on constantly as long as life lasts. Coagulation or clotting is the property of the blood which is of most interest to the student of first aid. While the blood is circulating in the living vessels it remains fluid, but as soon as this influence is removed it coagulates or clots, thus tending to stop bleeding. It is easy to see if Nature did not provide this safeguard that the slightest scratch sufficient to draw blood would result in the loss of all the blood in the body. The rate of loss would be regulated simply by the size of the opening just as is that of water flowing from a pipe. Very rarely a person

is found whose blood does not clot. These people are called "bleeders," and they often bleed to death from a trivial injury, such as the pulling of a tooth.

All efforts to stop bleeding have as their object clotting of the blood so that the clots will plug the bleeding vessels. Therefore, we must know the best way to help the clots to form. First in importance, in order that blood may clot, is comparative rest. A spouting stream of blood will never clot except where it falls and is therefore at rest. This is like water, standing water will freeze but running water will not. Free exposure to air also favors clotting. Coagulation is likewise more promptly effected by contact with foreign substances, especially if they afford many points on which clots may form. Gauze is a good example of such a material. Cobwebs are also, and they were much used even by surgeons before the danger of dirt in a wound was so well understood.

For further discussion of this subject, see Wounds, page 86.

RESPIRATORY SYSTEM

The respiratory System consists of the Nose and Mouth, the Windpipe and the Lungs.

At the upper end of the windpipe is the Larynx, part of which we know as the prominent Adam's Apple in the throat. As the larynx is in front and the gullet is behind, food passing to the latter must pass over the upper end of the larynx and would enter it if some protection were not provided. This is afforded by the Epiglottis, a muscular flap or curtain which falls into position, covering the upper end of the larynx so that ordinarily food does not enter it. Sometimes, however, the epiglottis does not do this, especially if one swallows quickly or attempts to talk while swallowing. In this case choking results from food entering the larynx, or, in common words, one has swallowed the wrong way. The attempt to give food or water to an unconscious person will also result in choking him because his epiglottis does not close.

The Lungs are two soft, spongy, structures, each of which is bag-like in shape and is made up of air cells with many

blood-vessels surrounding them; they are, sometimes, compared to a bunch of grapes. The lungs are hermetically enclosed in the chest, so that when the cavity of the chest is increased or diminished in size, the same effect is produced on the lungs themselves. Certain muscles are of great importance in filling and emptying the chest and lungs. Ordinarily, the muscular movement consists simply of the bellows action of the chest and the up and down movement of the diaphragm. In order that the chest may be enlarged to its greatest capacity, however, some of the muscles of the upper extremity must also take part. In order that they may do so, the arms are raised vertically above the head, so that certain muscles attached to the chest wall and to the upper extremities will, when the latter are fixed, raise the ribs and thus enlarge the chest. The chest, too, is elastic and direct pressure upon it will diminish its size and so force the air from the lungs. (See Artificial Respiration, page 124.)

The rate of respiration is 16 per minute.

The lungs aerate or oxygenate the blood. The small blood-vessels surrounding the air cells which the pure air breathed in finally reaches, carry dark blood which has lost its oxygen in the tissues. This blood receives oxygen from the pure air and returns to the heart as bright arterial blood. The air which is expired from the lungs has not only lost its oxygen to the blood, but has also received certain impurities from the latter.

From what has been said it is easy to understand that the nose and mouth and the windpipe are simply a passageway for the air going to and coming from the lungs. Naturally, anything which blocks this air in its course will interfere with the supply of air to the lungs and complete blockage will result in early death from suffocation or asphyxiation. Examples of substances which block the air passages are water in process of drowning or any foreign body in the throat. Illuminating gas and some other gases block out good air from the lungs by themselves replacing it.

A special nerve centre in the brain governs breathing just as other similar nerve centres govern other actions of the body.

Paralysis of this centre will stop the breathing as effectively and completely as blocking the passage of the air to the lungs. In opium poisoning, certain injuries of the brain and in electric shock this centre is paralyzed.

Breathing is stopped in still another way. This is by pressure on the chest and abdomen, as when the body is covered by rock, gravel or timbers.

DIGESTIVE SYSTEM

This is the system by which food is received and is prepared for the use of the body. In the mouth the food is first subjected to the action of the teeth which divide it into smaller pieces so the digestive juices may have a better opportunity to digest it.

The teeth appear in two crops; the first or milk-teeth, 10 in each jaw; the second or permanent teeth, 16 in each jaw. The milk-teeth usually begin to appear from 4th to the 7th month after birth, and in the 6th year the first of the permanent teeth begin to replace them. This process goes on for from 6 to 7 years until all the teeth are permanent, though the wisdom-teeth do not appear until from the 17th to the 21st year. The milk-teeth, when they are being replaced by the permanent teeth, become loose so that they may be easily pulled. The permanent teeth are closely anchored to the jaw, however, and both strength and skill are required to pull them. The teeth are covered with a very hard substance called enamel. This is pierced by decay so that the nerves are exposed and are liable to become inflamed and very sensitive and painful, which is the cause of toothache.

From the mouth the food enters the esophagus or gullet, through which it passes to the stomach and then to the small and large intestines from which the residue is expelled. In its course it is acted on by the various digestive fluids, which change it so that it may be absorbed into the blood. The two largest glands in connection with the digestive system are the liver and the pancreas, the former supplying bile and the latter pancreatic juice. Both of which are digestive fluids.

A part of the intestine, and near the junction of the small and large intestines, is the Vermiform Appendix, which is so liable to

inflammation with the resulting disease called Appendicitis. The appendix lies at some distance under the wall of the abdomen, at a point on a line from the prominent point of the hip-bone in front to the navel, about one and one-half inches from the former.

NERVOUS SYSTEM

Through the Nervous System the actions and functions of the various parts of the body are performed, regulated and controlled. This system is really a double one. One part is composed of the Brain and Spinal Cord and the Nerves connected with them, and the other is the so-called Sympathetic Nervous System.

SPECIAL SENSES

It is hardly necessary to discuss the special senses here. Some of the organs of special sense are, however, subject to injuries peculiar to themselves, and therefore it is important to know something of their anatomy.



FIG. 1.—The eye. (*Potter's Anatomy.*)

The Eye is the organ of sight. It is a ball surrounded by three coats. At the front of the eye is the Iris with an opening in its centre, the Pupil. Covering the eye-ball in front is a delicate membrane called the Conjunctiva. Protection to this membrane

is afforded by the Eye-lids when they are closed, but when they are open it is very liable to injury and to the entrance of foreign bodies. These are commonly spoken of as "something in the eye." On account of the sensitiveness of the conjunctiva, they cause much pain and distress. The eye-ball itself is well protected from injury, as it is situated deeply in the head and the brows overhang it. Pointed objects may, however, enter it. When this occurs severe damage almost always results.

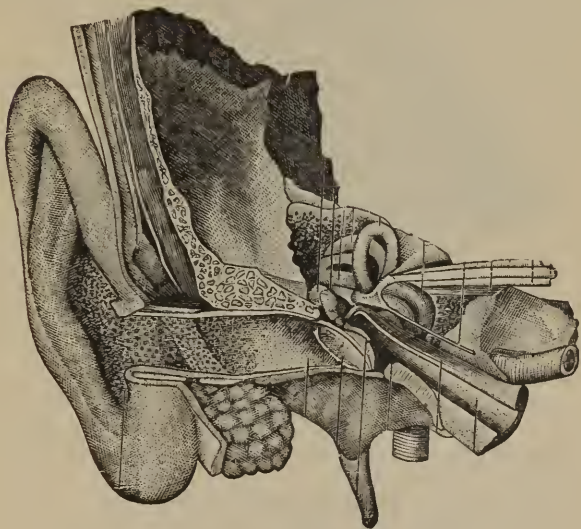


FIG. 2.—The ear. (*Gould's Dictionary.*)

The Ear is the organ of hearing. Leading from the outer ear which we see is a passageway called the Auditory Canal, which is separated from the middle and the internal ear by the Ear-drum.

Rupture of the drum is a very serious accident which is caused by a loud concussion near the ear or by putting objects, especially pointed ones, into the auditory canal, as well as by disease.

The Nose.—The sense of smell is located in the upper part of the nose, which is separated from the mouth by the hard and soft palates. Both mouth and nose open into the Pharynx behind. The nose is well supplied with delicate blood-vessels, which are easily broken, with resulting nose-bleed.

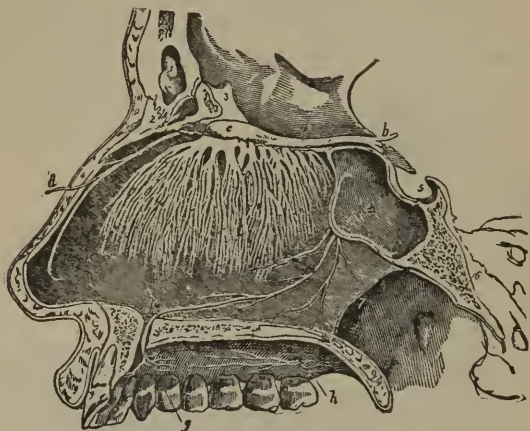


FIG. 3.—The nose. (*Potter's Anatomy.*)

QUESTIONS

1. What is anatomy?
2. What is physiology?
3. Of what is the body composed?
4. What is the skin? How does it protect the body?
5. What is the mucous membrane?
6. What is the skeleton and what does it do as a part of the body?
7. Of what parts is the head made up?
8. Into what two parts is the trunk divided and what does each contain?
9. Describe the spinal column; the ribs; the breast-bone; and the pelvis.
10. Of what bones is the upper limb formed? The lower limb?
11. What is a joint?
12. What movements do joints have? Give an example of a ball-and-socket and of a hinge joint.

13. What are the muscles?
14. What is the purpose of the muscles?
15. What is the importance of muscles in reference to fractures and dislocations?
16. What is the purpose of the heart? Describe its action.
17. What is the heart beat and how often does it occur?
18. What are the different classes of blood-vessels? Describe each.
19. What are the characteristics of bleeding from an artery?
20. In bleeding from an artery where would you press, and why?
21. Where would you press to stop arterial bleeding from: the scalp, the side of the head above, the lower part of the head and the neck, the shoulder or arm-pit, the arm or hand, the palm of the hand, the thigh, leg or foot?
22. What are the characteristics of bleeding from capillaries?
23. How would you stop bleeding from capillaries, and why?
24. What are the characteristics of bleeding from veins?
25. How would you stop bleeding from veins?
26. What is the blood? What does it do?
27. Describe clotting of the blood.
28. What helps to make the blood clot?
29. Of what does the respiratory system consist?
30. Describe the action of the lungs.
31. How often do we breathe?
32. In what different ways is suffocation caused?
33. Describe the digestive system.
34. Give a very brief description of the nervous system.
35. Describe briefly: Eye, Ear, Nose.

PRACTICAL EXERCISE

Show the course of the important arteries on the body and their pressure points.

CHAPTER III

GERMS OR MICROORGANISMS. INFLAMMATION

While the body may rightly be regarded as a machine, it is subject to one class of injuries to which other machines, are not liable. The injuries referred to are caused by microorganisms, or germs.

Of recent years so much has been written on the subject of germs that it might be thought that everybody should know all about them. This is by no means the case, however, and it is probable that on no one subject are erroneous ideas more commonly held. This is not the place to discuss the germs or microorganisms which are responsible for contagious diseases, but only those which are of importance so far as wounds are concerned. By far the commonest and most important of these are the so-called pus germs, which are very small organisms—too small to be seen except through a powerful microscope. These germs cause inflammation and the formation of pus, or matter. They exist in countless millions, but they do not live in the tissues of our bodies and must, therefore, always enter them from outside. This is a most important fact to remember. It is also important to know that pus germs do not float in the air and so cannot be carried to a wound from the air. Pus germs are found on the surface of our bodies, on knives and other objects which cause wounds, in the dust of houses, in water, etc., and also on surgical instruments and dressings unless special means have been taken to free them of germs or, in other words, unless they have been disinfected. A disinfected object is surgically clean. Surgically clean means simply free of germs. You must keep clearly in mind that ordinary cleanliness does not mean surgically clean. They are quite different things.

Suppose a wound is received, what happens? If pus germs do not gain access to it, there will be no inflammation and it will heal quickly and kindly; but if, on the other hand, the wound is infected by pus germs, this means that inflammation will follow, more or less matter will form, and there will be absorption of poisonous products from the wound which may result in the more severe forms of blood-poisoning and almost inevitable death. But as pus germs are so generally present, it might appear that under ordinary conditions they would always be carried into a wound when it is received, either from the surface of the body or by the object which causes the wound. This is true, but if only a few pus germs are carried into the tissues they will dispose of the germs without trouble and no harm will result; moreover, unless too many pus germs are carried into the body, the blood resulting from the injury will often wash so many out that the tissues can dispose of the few left with little difficulty. This is exactly the reason why a wound which bleeds freely is less likely to prove dangerous afterward. With the ordinary wound, therefore, we can never be sure immediately after it has been received whether or not pus germs are present in it in sufficient numbers to infect it and our duty is quite clear. We must assume that the wound is not contaminated and must use every care not to contaminate it by our hands, by instruments, dressings, etc. This is best accomplished by covering it with a disinfected dressing, as this will prevent contaminated articles from coming in contact with it. (See Compresses, page 44.) But if no such dressing is available, it is best, when possible, to leave it exposed to the air, for, as has been stated, danger of contamination is not to be feared from the air. Ordinary water is dangerous, as it may contain many pus germs.

This liability to infection not only exists at the time a wound is inflicted, but afterwards so long as the wound is raw. Every precaution to prevent infection should, therefore, be observed during all this time.

The symptoms of inflammation in a wound are heat, redness, pain, swelling and partial or complete loss of use of the wounded part. The severity of these symptoms varies considerably with

the virulence of the germs which enter the wound—for they are by no means equally virulent—and with the depth of the wound. We hear occasionally of a person who has received a slight scratch having a very severe inflammation of the injured part, and perhaps dying from blood-poisoning. In such a case we may be very sure that the pus germs which entered the trivial wound were very virulent. Usually, however, the course of such wounds is not severe. The pus germs which enter it at the time it is received, or afterward, cause some irritation. This brings more blood-cells to the part and we have inflammation. Some of these cells are destroyed by poisonous products of the pus germs. This gives rise to the formation of pus, but the blood-cells form a barrier against the germs and they cannot advance further. A scab made up of blood, pus and some dirt forms on top of the wound, helping to protect it from further infection, and healing takes place under the scab, which is gradually pushed off by the healing tissue. Most of us have had numerous opportunities to follow the course of such wounds in slight injuries to our hands.

Suppose the infected wound is deep, however, exactly the same process takes place usually, but it is carried much further, and instead of the moderate inflammation with a small amount of pus which is produced before the blood-cells form their barrier, inflammation is severe, a large amount of pus forms and an abscess is produced. The original wound has probably closed by this time, so this abscess is surrounded on all sides by the inflamed tissues of the body. Its contents are irritating, and unless it is very small will not be absorbed, so it works toward the surface, causing inflammation meanwhile. As soon as the contents escape, however, the irritation is removed and the sides fall together and healing takes place.

With virulent infections, especially deep ones as the micro-organisms breed much more rapidly in captivity, the poison of the pus germs is so powerful that the blood-cells cannot form a barrier, the inflammation spreads, and the poison gains entrance to the blood-vessels and is carried to the brain, the heart, etc., and death is very likely to follow from blood-poisoning. The symptoms of this condition need not be mentioned here, but it is well to

remember that it is not the immediate result of an injury, but appears only after what has been described above has taken place. Usually some days are required, but the period is shortened in a very virulent infection.

In plain words, therefore, the infection of a wound means more pain, slower recovery, perhaps a scar which will give trouble afterward and a certain amount of danger to life; and deep wounds are more to be feared than superficial ones.

Is there no substance which will prevent infection of a wound? Yes, to a considerable extent, iodine. This will be discussed later.

Tetanus, or Lock-jaw, is caused in the same way as pus infection. That is to say, a wound is infected with the germs of tetanus, absorption from it takes place, and the result is lock-jaw. The special germ of tetanus does not exist in all localities, but where it does even more care, if possible, should be exercised so far as wounds are concerned.

Rabies should also be mentioned here; it will be discussed at length under the proper heading.

QUESTIONS

1. What kind of injury is the body liable to which does not affect other machines?
2. What are pus germs?
3. What effect do they have on a wound?
4. What are the symptoms of inflammation in a wound?
5. What do you mean by the word, symptoms?
6. Is there any substance which will prevent infection of a wound? What is it?

CHAPTER IV

FIRST AID MATERIALS

BANDAGES; WOUND DRESSINGS; PLASTER AND COLLODION;
SPLINTS; TOURNIQUETS; HEAT; COLD; STIMULANTS;
EMETICS

It is almost as important for the workman responsible for the operation of a machine to know how to make practical use of the tools which he requires to repair it as to know how the machine is constructed and how it operates. This is equally true for the first-aid student. Therefore, this chapter is devoted to his tools and repair materials.

BANDAGES

Kinds of Bandages

There are 3 kinds of bandages; Triangular, Roller and Four-tailed.

There are 3 materials for bandages: Gauze, Muslin and Flannel.

There are 3 purposes for which bandages are used: To keep dressings and splints in place; To stop bleeding by pressure; and As slings.

I. Triangular Bandage.—The triangular bandage is best suited for general first-aid work, as it can be easily made anywhere, is not difficult to apply as a temporary dressing and is not likely to be put on so tightly that it will cause injury by stopping the circulation of the blood.

The triangular bandage is commonly made from unbleached muslin, though any strong cloth will answer. Bed sheets, pillow cases, napkins and handkerchiefs may all be used to make it.

It is desirable that the piece of cloth for the bandage be not less than 34 to 38 inches square. It is folded diagonally and is cut across in the fold; of course this will give two triangular bandages. While made triangular bandages may be readily bought, the only advantage they possess is that most of them have pictures showing methods of application stamped upon them.

The triangular bandage may be applied in two ways:

Unfolded.

Folded.

Unfolded means that the bandage is used in the form of the whole triangle.

To fold, the point of the triangle is brought to the middle of the opposite side, and then the bandage is folded lengthwise to the width desired. When folded so as to make a narrow strip the bandage is called a cravat.

2. **Roller Bandage.**—The roller bandage is invaluable for the surgeon but this is not the case with the first aider. The latter must, however, know how to make use of any appliance at hand, and he is very likely in an accident to find it more convenient to obtain the roller bandage so it is well that he should know the principles of its application.

Roller bandages are usually made of muslin, flannel, gauze or cheese cloth, and they may be improvised by tearing strips from a sheet and rolling them up. By far the best material is gauze or cheese cloth. This is elastic and fits itself well to the part to be bandaged so that bandages made of it are easy to apply and do not have the disadvantages of inelastic bandages of muslin, which in unskilled hands are very apt either to be pulled so tight on one edge that they cut off the circulation, or to be so loose that they will not stay in place.

While roller bandages may usually be readily bought, it is well to know how they should be rolled. One end of the bandage should be turned over for a distance of about 6 inches, this lap should be folded on itself and this process should be repeated till a small hard roll is formed. Then place the bandage on the thigh (the foot should be on a stool or chair so that the thigh is



1. Eye Bandage



2. Neck Bandage



3. Jaw Bandage

4. Head Bandage
(Front)5. Head Bandage
(Rear)

PLATE V.—Triangular bandages.

nearly at right angles to the body) with roll of bandage near the body, length of bandage at bottom of roll and bandage extending down the thigh. Roll, beginning with the fingers of right hand running down to the wrist, and repeat till bandage is completely rolled. The left hand is used to hold the bandage tight and even. The bandage when completed should be in a hard roll with even edges.

Roller bandages are preferably used in the following sizes:

For the finger, $\frac{3}{4}$ of an inch wide and 1 yard long.

For the arm and head, $2\frac{1}{2}$ inches wide and 4 to 6 yards long.

For the leg and thigh, 3 inches wide and 6 to 8 yards long.

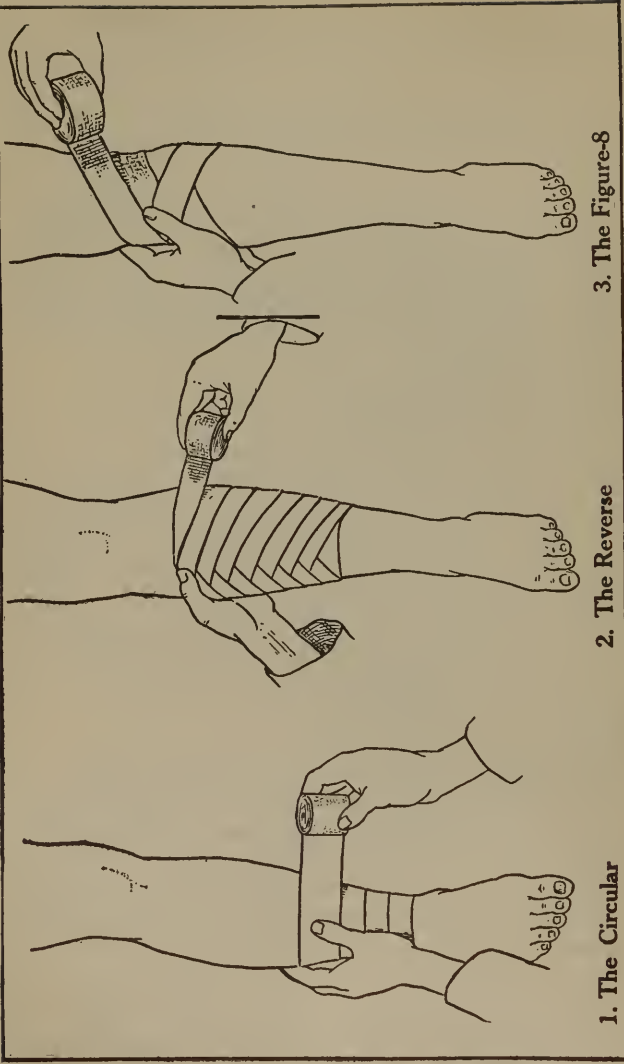
For the chest and abdomen, 4 to 5 inches wide and 8 to 12 yards long.

The bandage $2\frac{1}{2}$ inches wide and 4 to 6 yards long is the most generally used.

While it is not, of course, absolutely necessary to use the bandage best adapted in size for the part to which it is to be applied, it is very difficult to bandage satisfactorily a small part with a wide bandage. Any bandage when rolled may be easily cut through with a sharp knife and thus a bandage of the required width may always be obtained.

The roller bandage is applied by holding the roll in the right hand, the loose end being in the left, and laying the outer side of the end on the place where it is desired to start the bandage.

The simplest method of application is the Circular, but this can be used only when the part to be bandaged is of nearly the same circumference throughout. This is the case with the forearm above the wrist, and with the fingers. In first-aid work, however, the roller bandage is usually applied to hold splints or dressings in place which much extends the field of the circular method of application as, especially with splints, an even circumference is likely to be presented. The circular method is also more often available with gauze bandages, for on account of their elasticity they adapt themselves to slight pulling much better than do bandages made of stiffer cloth. The circular method of application consists simply of a series of circular



1. The Circular

2. The Reverse

3. The Figure-8

PLATE VI.—Roller bandages.

turns from below upward, each turn overlapping the upper third of the one below.

Where the part is larger at one end than the other, at the start a few turns should be made round and round one over the other, then begin to move up the limb, using the circular method as long as a turn overlaps the preceding one about one-third. It will be found as soon as the limb increases much in size that if the bandage lies flat, uncovered spaces will be left. To prevent these spaces the Reverse must be employed. The Reverse is generally considered to be the most difficult point to learn in the application of any bandage.

To make the Reverse, place the thumb of the left hand on the lower edge of the bandage to hold it in place, slacken the bandage between the hands (about 3 inches) and turn the roller one-half over toward you. Pass the roller under the limb keeping the lower edge of the bandage parallel with that of the turn below, reverse again at the proper point and so on. The reverses should be made so they lie in the centre of the limb or to its outer side and all reverses should be in one line up the limb.

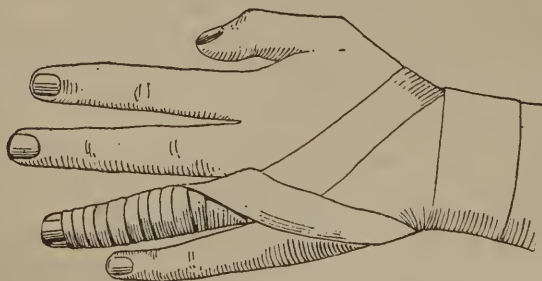
The figure-of-8 bandage is found specially useful about joints. It consists of a series of loops each overlapping the one below by about two-thirds the width of the bandage. The middle part is over the bend of the joint, while the loops lie one below the other above it.

The spica bandage is a modification of the figure-of-8 bandage, having one loop much larger than the other.

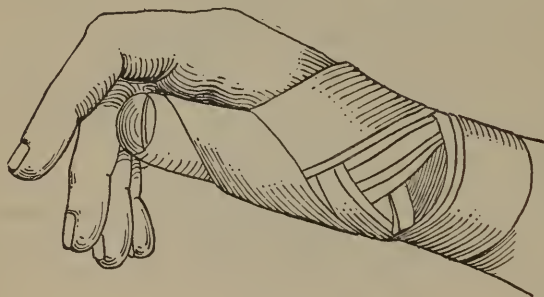
A very valuable exercise in the application of the roller bandage is afforded in bandaging the leg from the foot to include the hip. This gives an opportunity to practise all the methods of application which have been described.

For those unskilled in bandaging, lengths may be cut from a roller bandage and these may be tied or pinned in place in the same way that the folded triangular bandage is used.

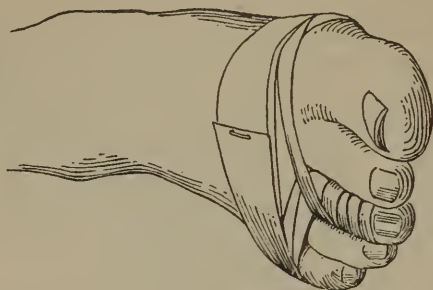
3. Four-tailed Bandage.—This is especially useful for fractures of the lower jaw and injuries of the head. Preferably a piece of cloth 5 to 8 inches wide and from 2 to 3 feet long should be used. It should be doubled on itself and torn from each end



1. Roller Spiral Bandage for the finger.



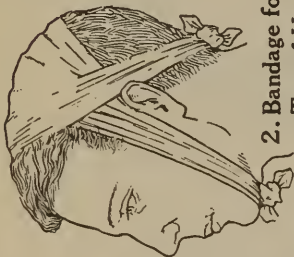
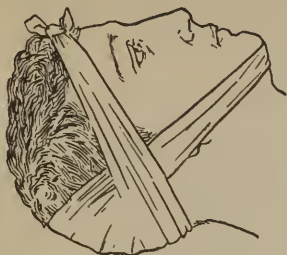
2. Figure-of-eight Roller Bandage for the thumb.



3. Roller Bandage for the toe.



1. Bandage for Forehead

2. Bandage for
Top of Head3. Bandage for Back
of Head

4. Bandage for Nose

5. Bandage for Jaw. (This
is an excellent Bandage for
Fracture of the Jaw)

until a piece about 4 inches long is left undivided in the middle. The 4-inch roller can be used to make this bandage for the lower jaw; it is rather too narrow for the head. The four-tailed bandage is made from it exactly as described above.

How to Fasten Bandages

Triangular and four-tailed bandages are usually completed by tying the ends together securely though they may be pinned, and frequently with triangular bandages flaps are held in place by pinning. The free end of the roller bandage is usually turned over and pinned in place. Other pins are frequently used to hold the different layers of the roller bandage from slipping. Safety pins are better than ordinary pins as they hold better and

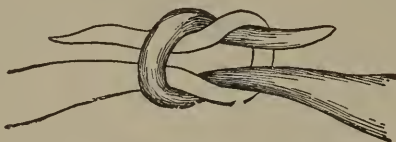


FIG. 4.—Reef knot. (*Davis.*)



FIG. 5.—Reef knot. (*Davis.*)

scratching is prevented. A convenient method sometimes employed in securing a roller bandage is to rip the bandage at the end down the centre, then to tie a knot to prevent further ripping and carrying the ends around the limb in opposite directions, tie.

Knots should be placed where they do not cause discomfort and where they may be easily reached. The reef knot, as it is secure, should always be employed in place of the granny knot. To tie the reef knot proceed as follows: Hold the ends of the bandage in the two hands; wind the end held in the right

hand over that held in the left; then wind the end now held in the left over that held in the right and bring it through the loop. If you do not know the reef knot, tie three knots.

Precautions

Whatever the bandage used, care must be taken that it is not put on too tightly. It must not be so tight that it constricts at any point, for this will cut off the blood supply, and if the bandage is left in place for some time even so severe an injury as mortification or actual death of the part below may be caused. Pain, swelling and blueness or coldness of limb below the bandage show that the bandage is too tight and should be loosened or removed.

Always bandage firmly, but never too tightly or loosely.

Always in bandaging a limb, leave the tips of the fingers or of the toes uncovered so that they may be seen.

Always place the part to be bandaged in the position in which it is intended to leave it, as otherwise change of position may result in cutting off the circulation by drawing the bandage too tight at some point.

Never put on a bandage under, but always over a splint.

Always in applying a bandage immediately after an injury, remember that there may be swelling and use care in order that the bandage may not become too tight from this cause; always be ready to remove or to loosen a bandage when such swelling makes it too tight.

Never apply a bandage wet, for as it dries it will shrink and become too tight.

Always bandage from below upward with the roller bandage.

Never reverse the roller bandage over a sharp bone and always use the figure-of-8 over a joint.

Uses of Bandages

Bandages are used:

1. To keep dressings and splints in place.
2. To stop bleeding by pressure.
3. As slings.

Bandages for Splints and Dressings.—When roller bandages are used to hold splints or dressings in place they are wound around and around in the manner already described. For the same purpose cravats are made of triangular bandages. These are simply carried around the splint or dressing and the limb, body or head and are tied in place. The number of cravats is dependent on the length of the splint or dressing.

Bandages to Stop Bleeding.—Most bleeding can be stopped by the pressure exerted by a bandage. For this purpose the bandage whatever the kind used is applied snugly but not too tightly over the dressing covering the bleeding point.

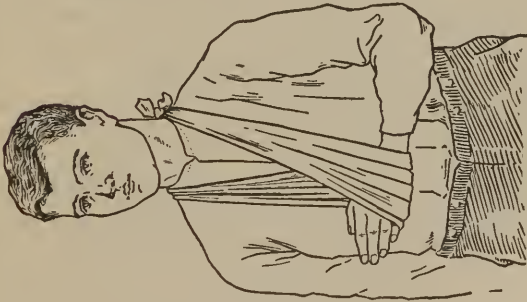
Slings.—1. Arm slings:

Place one end of a triangular bandage over shoulder of uninjured side. Allow length of bandage to hang down in front of chest so that point of triangle will be behind elbow of injured arm. Bend elbow of injured arm to a right angle. This will bring forearm across middle of bandage. Then carry lower end of the bandage over the shoulder of the injured side and tie to the upper end behind the neck. Bring the point of the bandage at the elbow forward to the front and pin there so that bandage is snug but does not pull.

This makes an excellent arm sling, but even without a bandage a good sling may be made for the arm by pinning the sleeve or the skirt of the coat to the front of the coat. The shirt may be used in the same way. (Plate IX.)

The cravat may also be used for an arm sling. For this purpose it is employed in the form of a loop which encircles the forearm bent at a right angle and the neck. (Plate IX.)

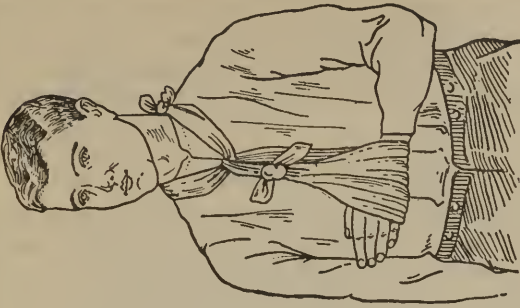
Still another arm sling is made from the roller bandage. For this a 3- or 4-inch roller is required, preferably the latter. Bend the forearm on the arm at the angle at which it is desired to hold it; this is usually about a right angle. Put the end of the roller about midway between the forearm and shoulder and hold for a moment to get length required when it may be allowed to drop. But before doing so pass roller in front and under forearm just in front of the elbow. Then carry roller along front of chest to the shoulder on the injured side, over this shoulder to back of



1. Arm Sling



2. Arm Sling from Shirt Sleeve



3. Sling made with two Handkerchiefs

neck, in front of wounded shoulder, down to make loop for hand, back over sound shoulder, back of neck and in front of shoulder of injured side to starting point where length required will be cut off and the ends will be tied together. Two loops have, of course, been made, one for the forearm near the elbow and the other for the hand.

Application of Bandages

Head Bandages.—Fold a hem about $1\frac{1}{2}$ inches wide at the long side of the unfolded triangular bandage. Place the bandage so that the hem lies squarely across the forehead just above the eyes and the bandage is over the head with the point hanging down the back. Carry the two ends around the head above the ears, cross at the back and tie them across the forehead. Draw the point down tight, turn it up and pin it at the top of the head with a safety pin. This is a useful bandage. (Plate V.)

The four-tailed bandage is also useful as a head bandage. It is applied in three ways. For the front of the head the center of the bandage is placed on the forehead and the ends crossed are tied at the back of the head and under the chin; for the top of the head the centre of the bandage is placed there and the ends crossed are tied low at the back and under the chin; for the back, centre is put at back of the head and the ends crossed, are tied at forehead and under chin. (Plate VIII.)

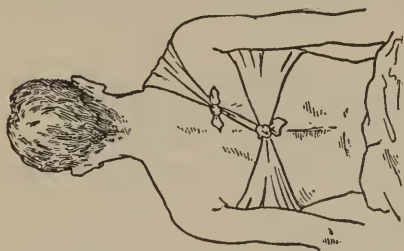
Eye Bandage.—Place the centre of the cravat made from the triangular bandage over the injured eye, bring the ends to the back of the head and tie. (Plate V.) A length cut from the roller bandage may be used in the same way.

Nose Bandage.—Four-tailed. Place centre on nose, cross ends, carry one pair below and other above ears and tie both at back of head. (Plate VIII.)

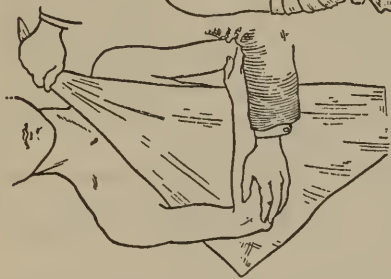
Jaw Bandage.—For this, two cravats are necessary if made from triangular bandage. Apply the centre of the first across the chin in front, bring the ends to the back of the neck and tie. Place the centre of the second cravat under the chin, cross the ends over the top of the head, bring them down and tie under the chin.



1. Bandage for Chest
(Front)



2. Bandage for Chest
(Rear)



3. Arm Sling (Begin)



4. Arm Sling (Completed)

An excellent bandage for the jaw may also be made from the four-tailed bandage. The centre is placed with its middle at the point of the chin and the ends are crossed, one pair being tied at the top of the head and the other at the back of the neck. (Plate VIII.)

A single wide cravat may be placed under the chin, with the ends carried to the top of the head and tied there or a length from a roller may be used in the same way. (Plate V.)

Neck Bandage.—The centre of the cravat of the triangular bandage or of a length from a roller bandage is placed over the injured place and the ends are carried around the neck and tied as convenient. This bandage is sometimes made by the use of a cardboard support which is held firmly in place between the layers of the bandage. (Plate V.)

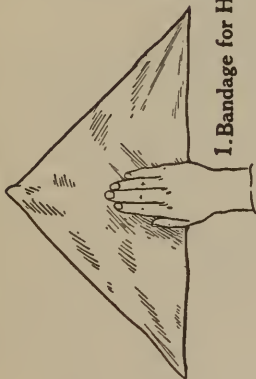
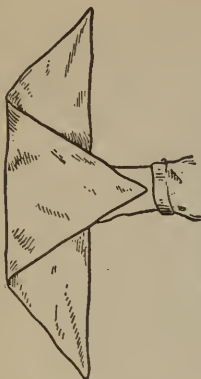
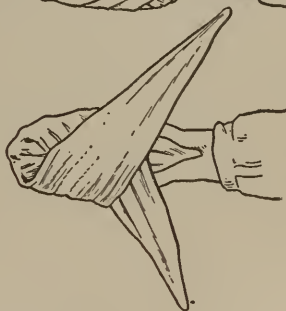
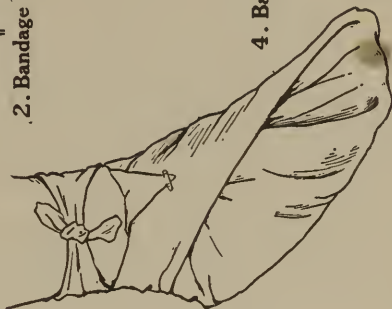
Chest and Shoulder Bandage.—The triangular unfolded is used. The long side is placed horizontally across the chest, the upper end is brought over the shoulder, and the ends are tied at the back. (Plate X.)

Chest and Pelvis Bandage.—A wide roller is applied around and around the body. Triangles in the form of cravats may also be used.

Hand Bandage.—The triangular bandage is spread out. The hand is placed on it, palm down, with the fingers toward the point (if desired, the hand may be closed), and the wrist is at the long side. The point is then brought over the back of the hand to the back of the wrist and the two ends are crossed over the wrist and tied. (Plate XI.)

Bandage for Palm of Hand.—Place the centre of the cravat on the palm of the hand, cross the ends at the back of the hand and again at the front of the wrist and tie at the back of the wrist.

Crotch Bandage.—This is the T bandage. It is made from two lengths of a 3-inch roller bandage. To the centre of one of these, $1\frac{1}{2}$ yards long, is sewed or pinned at right angles the other, which is 1 yard long. The bandage is applied by placing the long strip around the waist with the short one at the middle of the back. The long strip is then pinned in front and the short

1. Bandage for Hand ⁽¹⁾2. Bandage for Hand ⁽²⁾3. Bandage for Hand ⁽³⁾

4. Bandage for Foot

strip is brought forward between the legs to join the long one at the centre in front where it is pinned.

Foot Bandage.—Spread out triangular bandage. Place foot in centre with toes toward point. Raise point over toes to instep in front. Bring both ends forward, cross them over instep and tie them around the ankle. (Plate XI.)

Adhesive Plaster as Bandages

Adhesive plaster is sometimes used by surgeons in place of bandages. That is to say, surgeons sometimes use adhesive plaster to keep dressings and splints in place, to stop bleeding by pressure over a dressing and for special slings. Moreover, adhesive plaster is employed by surgeons to exert pressure over a sprained joint. They never use it, and it should never be so used, directly on a wound. The reasons for this will be explained under the subject of wounds.

The use of adhesive plaster for any purpose is not for the first aider, however. For them all its surgical uses are better performed by a bandage. Its disadvantages are that it cannot be improvised, it requires preparation of the skin for application, it will not adhere to moist surfaces, it may cause injury by too tight application and it is painful to remove.

WOUND DRESSINGS

A wound dressing consists of everything which is used to cover or to dress a wound. The pad which is put directly on the wound is called a compress. In ordinary emergency treatment a bandage is put on immediately over the compress and this is all that is necessary. With much bleeding it is better, if you have it, to put a layer of absorbent cotton over the compress and then to bandage. It is important that the compress should not only be large enough to cover the wound but to lap an inch or so on each side. Do not forget that the compress is the most important part of the dressing. It is the inside we are looking after, not the outside and a beautifully applied bandage will not make up for a dirty or poorly applied compress.

Surgeons commonly say dressing materials are clean or dirty. They mean surgically clean for the former, that is to say, the

germs in them have been killed by some means. Every material is dirty in the surgical sense if the germs have not been killed. Surgically clean, sterile, or antiseptic dressings as they are variously called are, of course, the only kind that should be applied to wounds.

Most things required by the first aider he can make. As will be seen, however, the process of making good wound compresses is complicated and it is much safer to have such articles ready at hand.

Of course it not only is necessary that the germs be killed at the time a wound compress is made but when it is put on the wound that it has not been contaminated in the meantime and that it can be handled at that time without being contaminated.

The necessity for a safe dressing for wounds led to the making of the American Red Cross First-aid Outfits.

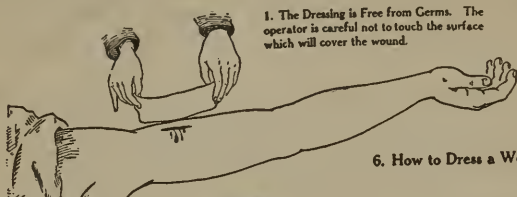
In each of these outfits is found a long gauze bandage with a compress of gauze sewn to it in the centre, a triangular bandage printed so as to show how to apply it, and two safety-pins.

The directions, which are also found inside the case, are as follows:

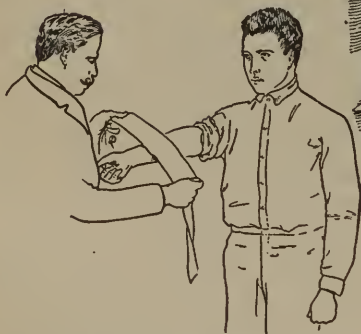
"Gauze Bandage with Compress.—If there is a wound or any injury in which the skin is broken, this bandage and compress are used by unfolding the bandage, **being careful not to touch the inner surface of the compress.** The compress should then be placed directly on the wound or injury, and held in place by wrapping the ends of the bandage around the limb in opposite directions and tying them or pinning them in place. With a very large wound which the compress will not cover, apply it to the middle of the wound and wrap the bandage around as before. In this case be careful not to touch any surface of the bandage which is placed on the wound. In case there is no wound, this bandage may be used like an ordinary bandage to hold splints in place, etc.

"Triangular Bandage.—The triangular bandage may be used as an outer bandage or as a sling in the manner pictured on it. This bandage should also be tied or pinned in place.

"Do not touch an open wound with the fingers, water, or any-



7. Red Cross First-Aid Outfit

8. Red Cross First-Aid Outfit
(Showing Contents)

A Compress is Sewed in the middle of a long bandage which is so folded that it is impossible to touch the surface of the compress which will cover the wound except through gross carelessness.

9. How to Apply Red Cross Compress

thing except the compress, or when very large the untouched surface of the bandage.¹

“The pressure of the bandage will stop ordinary bleeding.”

The advantages of this outfit are that the contents are always clean and ready for use, the dressing may be easily applied, and not only does it contain a dressing, but also a sling. With it and materials for splints which may usually be easily obtained you are ready for any ordinary injury.

A number of other first-aid packets are on the market which contain compresses that may be safely applied to a wound, though none is quite so easy to handle without accidental contamination as the Red Cross outfit. Each has printed directions on the box or container which must be carefully followed.

If a first-aid packet can be procured it should always be used in preference to anything else to dress a wound. The next choice should be sterile or antiseptic gauze. Small packages of such gauze suitable for compresses may be bought in most drug stores, and are found in emergency cases. (Sterile gauze is ordinary gauze in which the germs have been destroyed by heat, and antiseptic gauze is ordinary gauze in which germs have been destroyed by an antiseptic, usually bichloride of mercury.) In a city, therefore, or if an emergency case is available, one may easily procure a safe compress and all he need do is to handle it so that he will not contaminate it. This may be accomplished by holding it not with the fingers, but by the paper which covers it, allowing only the inner surface of this paper to come in contact with the gauze and never removing part of the paper until it has served this purpose. If, by chance, the gauze is touched by the hand great care should be taken to drop the untouched part on the wound and to place the gauze which has come in contact with the hand as near the outer layer of the compress as possible.

As stated, unless a safe gauze can be procured it is much safer to leave a wound exposed to the air than to cover it, but this will not always prove practical. It is especially in places where no gauze for compresses can be procured that circumstances render it necessary to cover wounds. In such localities it may be hours

¹ This should not be held to include iodine.

before the services of a doctor can be procured, so an uncovered wound will be exposed for a long time to accidental contamination, which will be almost inevitable from the hands or clothing of the injured person who must perhaps be moved. Iodine, of course, helps but will not wholly prevent this. A compress, too, affords an excellent means of checking bleeding, being often all that is required for this purpose.

Under such circumstances, therefore, it will be necessary to make a compress which, if not as safe as is desirable, is, at least, as good as can be procured. First, as surgically clean cloth for the compress as can be obtained should be used. This will be found in a towel, a handkerchief or other cloth of the same kind which has recently been laundered and has not been used since it was washed. Preferably, this cloth should be boiled for ten minutes or soaked in a solution of 1-2000 bichloride of mercury, corrosive sublimate, for an equal length of time. (Tablets of corrosive sublimate are in common use; they are known as anti-septic tablets. This substance is a deadly poison and its solution cannot be made in metal vessels.) The process recommended will give a compress which is safe to use, but an important practical difficulty is presented in applying such a compress to a wound. It will, of course, be so wet that it will not be possible to put it on the wound without squeezing some of the water out of it. To do this the compress must necessarily be handled and, as has been explained, pus germs exist in countless millions on the hands.

If possible, the hands must be cleaned surgically, which means they should be freed of germs. This should be done by hard scrubbing for five minutes with hot water, soap and a nail-brush, paying special attention to the nails. Preferably the hands should be washed under a tap instead of in a basin, and if a basin is used the water had best be changed two or three times. As a further precaution, when corrosive sublimate is procurable, the hands after being washed should be soaked in a 1-1000 solution of that chemical for a period of five minutes. The hands must not be wiped and they must not touch anything except the compress. The piece of cloth which is intended for

a compress may now be taken from the vessel in which it has been boiled or disinfected, but in so doing the operator should be very careful not to allow his hands to touch that part of the compress which he intends to put on the wound. On the contrary, he should pick up the piece of cloth by its outer surface and, holding it at all times by this, squeeze the water from it until it is comparatively dry and then put it on the wound without delay. If a fairly large piece is taken for the compress and if, previous to boiling, or disinfection, it is folded so as to fit the wound it will be handled much more easily and safely.

When no facilities are available for washing and disinfecting the hands, this naturally must be omitted, but the same precautions should be taken in handling the compress. Suppose, however, that in addition the compress cannot be boiled or disinfected, and yet it is absolutely necessary to have one. In this case one should again take a towel, handkerchief, etc., which has just been laundered, and without unnecessary handling apply its inner surface to the wound. Towels, handkerchiefs, etc., which have been used or handled, though they may look clean, are never so in the surgical sense and are therefore particularly dangerous to use as compresses.

You will be wise if you keep on hand two or three surgically clean dressings and some iodine.

Wound Washes and Paints.—There is no substance which should be used by the first aider to wash a wound. In the first place he can only succeed in washing in more dirt than he washes out. Secondly, water is dangerous as it contains many pus germs. This applies equally to soap and water. Strong antiseptics such as bichloride of mercury or carbolic acid will destroy the cells of the body which dispose of the pus germs before they kill the latter and should never be used. Peroxide of hydrogen is not strong enough to kill all germs and in a large or deep wound it washes some of them to uninfected parts which then become infected. Therefore, use none of these things but cover the wound to keep out pus germs.

Does this mean there is no substance, suited for first-aid use, which can be put on a wound so as to disinfect it, that is to say

which will kill the germs in a wound? This was true at the time the first edition of this book was written but since that time a very valuable discovery has been made in reference to the use of iodine for this purpose. While in the World War iodine has not wholly justified the hopes which resulted from its use in civil life yet painting iodine on wounds is unquestionably of considerable value in preventing their infection. The more promptly it is applied the better. If over two hours are allowed to elapse it is valueless.

The best iodine solution to use is Lugol's solution, a weak solution of iodine crystals with iodide of potassium in water. The tincture of iodine is a seven per cent. solution in alcohol and is too strong; it may be diluted with alcohol, one part alcohol to one of tincture.

The method of applying iodine to a wound is simply to paint it on freely being careful, so far as possible, to reach all parts of the wound. A camel's hair brush is the best thing to use but a bit of cotton on a stick will do very well. The iodine disinfects the brush so one need have no fear on that score. Iodine is sometimes poured into a wound.

While it burns considerably it may be used on any part of the body except on or near the eyes.

Unfortunately iodine corrodes the cork of a bottle, and its fumes are destructive, especially to metals. This is the reason the army medical department does not issue the solution. They keep the crystals in an hermetically sealed tube only making the solution when required for use. You can do the same thing or you can keep the solution in a bottle changing the cork from time to time. In this case it is best to put the bottle somewhere out of the way where it will not be likely to injure anything and so safeguarded that no one is likely to drink it by mistake.

The exact composition of iodine in the tubes used by the army is one gram of iodine and one and one half grams of iodide of potassium. The directions are to dissolve the contents of the tube in 50 c.c. (about an ounce and a half) of water or alcohol.

Among the Red Cross first-aid supplies is a special iodine container.

There is an additional reason for not washing a wound if iodine is used, for iodine produces much more irritation of the wet than of the dry skin. Grease seriously hampers the effect of iodine, however, and in very greasy wounds, such as those sometimes caused by machinery, the grease should if possible be dissolved before the iodine is put on. Ether, turpentine or gasoline will dissolve this grease. But if you cannot get one of them easily put on your first-aid dressing either with or without painting the wound with iodine. Never put any of these substances on other than a greasy wound. The iodine burns enough without adding to this by other irritants.

I advise you to use iodine if you have it but at the same time not to forget that if you put a surgically clean dressing on a wound without using iodine you have done a great deal to prevent infection. Nor is it safe to put a surgically dirty dressing on a wound even if iodine is used.

PLASTER AND COLLODION

These, of course, seal wounds on which they are used, so that if any pus germs have been introduced they are in the most favorable condition for doing harm. The use of plaster (except court plaster, to cover a trivial scrape not involving the entire thickness of the skin) must be absolutely condemned, for not only does plaster seal the wound, but it is not surgically clean.

Collodion and similar substances are, of course, extensively used on wounds, and the popular idea seems to be that they actually form a skin which protects the wound. This works very well if the wound has not been contaminated by the wounding agent, or subsequently before the collodion is applied. On the contrary, if it has been so contaminated, as previously stated, sealing it with collodion gives the most favorable condition for pus germs to multiply, and so, for inflammation. Collodion is not surgically dirty, however, like plaster, and the ether which it contains has some antiseptic properties, so it is not really as dangerous as plaster. A good rule to adopt is to use it only on slight, cleanly cut wounds made by sharp instruments, and to

have it removed by a surgeon if inflammation occurs. A very good wound dressing may be made with a few layers of antiseptic gauze placed over the wound and attached to the skin by collodion at the edges, no collodion being put over the wound itself.

SPLINTS

Splints are used to prevent movement at the point where a bone is broken. They must, therefore, be made of a stiff and rigid material. For first-aid purposes splints must generally be improvised from something which may easily be procured on the spot. Such articles are pieces of wood, broom handles, laths, rules, squares, wire netting, heavy cardboard, umbrellas, canes, pick handles, spades, rolls made of blankets or cloth, pillows alone or with pieces of board outside, rifles, swords and bayonets. With a broken leg it is possible to use the other leg as a splint.

In improvising splints a few precautions should be observed. Besides being rigid enough to prevent movement at the point where a bone is broken, they should be long enough to prevent movement at the nearest joints, as this will move the broken bone and they should be as wide as the limb to which they are applied, as otherwise the bandages holding them on will press on the limb as well as on the splint and thus cause pain and perhaps displace the ends of the broken bone. On account of the danger from swelling and in order to promote the comfort of the patient and not to rub the skin, splints should be well padded on the inner side with some soft material. The clothing sometimes answers this purpose fairly well when it is not removed. Substances generally used are cotton batting, waste, tow, flannel, pieces of cloth, grass, etc. If splints are not well padded, the limb to which they are applied must be watched with special care because the swelling is likely to make the splints too tight, which will cut off the circulation and may cause gangrene.

TOURNIQUETS

Tourniquets are instruments used to stop bleeding from an artery. Each has a strap to go around the limb, a pad to place on

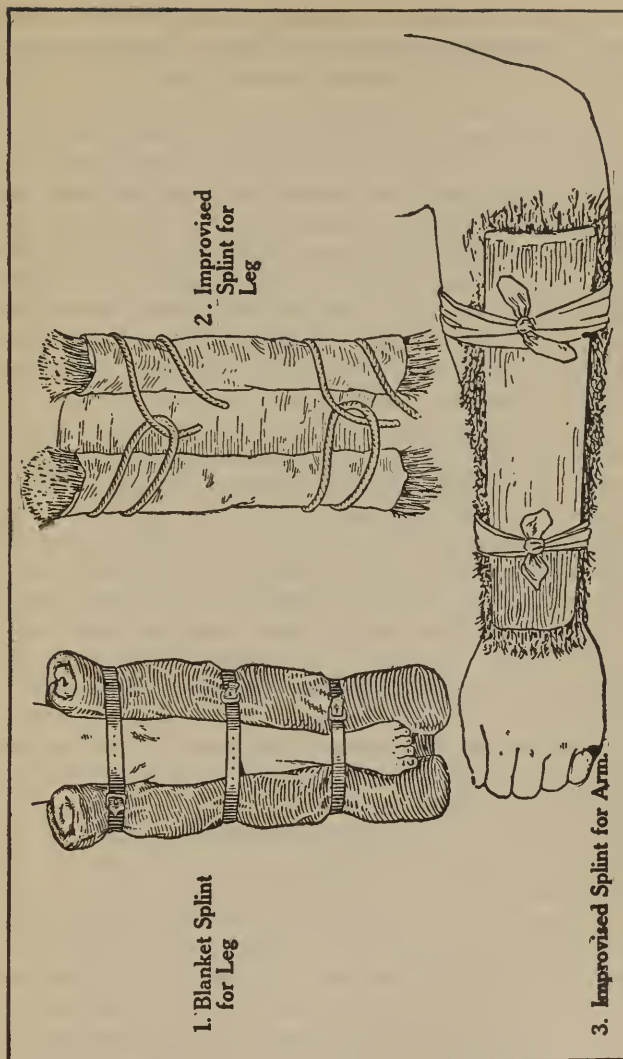


PLATE XIII.—Splints.

the artery and some means by which the pad may be made to press on the artery and thus stop the flow of blood. In an improvised tourniquet, which is the type most commonly used, the strap may be made of a handkerchief, towel, bandage or cravat, and a smooth round stone, a cork or some object of similar shape and size may be used for the pad. The stone, or the like, had best be wrapped in a small piece of cloth so that it will not bruise the skin too much. It is then placed over the artery above the wound and the strap is best passed twice around the limb and tied loosely at its outer side. A stick is introduced between the two layers thus formed and is twisted around until the bleeding is stopped. If desired, another bandage may be used to loop over and to hold the end of the stick from twisting back and so relieving the pressure of the pad on the artery. One layer of bandage may be used for the strap if more is not procurable. In order to avoid bruising in using this it is best after introducing the stick into the loop to twist away from the body. This is illustrated under Hemorrhage.

Besides the bruising of the muscles and skin which is certain to occur to some extent with any tourniquet, there is a much graver danger connected with their use. This is due to the fact that in consequence of cutting off the circulation, mortification and death of the part below may follow. If a tourniquet has been in place for an hour, therefore, it is desirable to loosen it and to allow it to remain loose if no bleeding occurs. It should not be removed as it may be necessary to tighten it again quickly should bleeding recommence. Whenever a tourniquet is used, a doctor should be sent for as quickly as possible, for if 3 or 4 hours pass with a tourniquet in place, mortification is very liable to follow.

Instead of tourniquets, appliances to make pressure on the whole circumference of a limb and thus to stop bleeding are sometimes employed. The strap which has just been described, without the pad, may be used for this purpose. A special elastic bandage and elastic suspenders have also been recommended. When possible, however, use the tourniquet, as cutting off the whole circulation by pressure on the entire circumference of a limb is much more likely to cause mortification than the tourni-

quet, which presses to the greatest extent on the artery alone. If circular constriction is used it should not be employed for over an hour.

HEAT

Heat employed externally is such a very valuable stimulant that every first-aid student should know how to make use of it. The ordinary hot-water bag is most convenient for this purpose, but glass bottles and jars are good. They should be covered with cloth or paper to prevent them from burning the patient. Hot bricks and stones are also useful. In using heat in this way it must be remembered that, especially with an unconscious person, there is considerable danger of causing severe burns, so one must make sure by testing the bottle, or the like, on his arm or face, that it will not burn even if left in contact with the skin for some time. In applying heat by means of the objects mentioned, to get the greatest effect, they should be placed between the legs, at their outer sides and between the body and the arms. A light hot-water bag lying over the heart acts as a special stimulant to it. The full hot bath—not warm, but actually hot—while effective as a stimulant, is more difficult to use than the hot-water bottles, etc., though it is well to remember that it may be employed for this purpose.

Heat applied locally causes the blood-vessels to enlarge momentarily and then to contract. Every one knows how shrunken the hands look after they have been in hot water for some time. For this reason heat may be used in congestion, too much blood in a part, or in inflammation. Cloths wrung out in very hot water are usually employed for this purpose.

COLD

Cold as well as heat is used in first-aid work. It is employed for three important purposes: first, to reduce the temperature of the body; second, to contract the blood-vessels locally and, third, to stimulate the respiration or breathing.

While the full cold or ice bath is the best method of applying

cold to reduce the temperature, cold may also be used for this purpose by placing bags filled with ice around the body. Sheets wrung out in cold or ice-water wrapped around the patient, may also be used. They should never be covered with a blanket, for in this case they will soon become heated from the heat of the body and instead of a cold bath a hot steam or Russian bath will result. In using cold to reduce the temperature it should be remembered that it drives the blood from the surface of the body to the internal organs and so causes shock, and that for this reason the body must be constantly rubbed to bring the blood back to the surface.

Cold may be applied locally in any case of congestion or inflammation to contract the blood-vessels; swelling after an injury is limited by this same action of cold. It always seems strange that the two opposites—cold and heat—should have the same effect on the blood-vessels, but this is actually the case. Cold is generally preferred to heat for this purpose, however, at least in all recent cases, such as those which are cared for by first-aid students. Ice bags, cold water running from a tap, cold water in a basin or pail or cloths wrung out in cold water are generally used. Cold metal, such as a wide knife-blade, sometimes proves a convenient means of applying cold.

Everybody knows that on jumping into cold water or on being struck by a stream of cold water he involuntarily takes a deep breath. This is due to the fact that the cold acts on the nerves of the skin and they convey the impulse to the brain, which transfers it to the respiratory organs. This so-called reflex action produced by cold is taken advantage of to cause breathing to start when it has stopped or to quicken and deepen it if it is slow and shallow. For this purpose cold water should be sprinkled on the face—the front of the body, the chest and the abdomen are particularly sensitive. Fanning increases the effect of cold used in this way, as it hastens evaporation.

STIMULANTS

The stimulating effect of heat externally has already been mentioned. All stimulants taken internally are best given hot

when possible, as aside from the particular stimulant used, heat itself is a powerful stimulant whether employed internally or externally. Safe and easily procurable first-aid stimulants are hot tea and coffee, hot beef tea and hot milk. In the absence of one of these hot water may be used. Aromatic spirits of ammonia is perhaps the most generally employed first-aid stimulant. It is best given in half-teaspoonful doses in one-third of a glass of hot water. But the exact dose is not important nor is it necessary to use hot water though it should not be given without some water as it is irritating. The water of ammonia, hartshorn or smelling salts which are practically the same things are also used as stimulants not by being swallowed but by being inhaled.

EMETICS

It is necessary to know a few simple and easy methods to cause vomiting.

Running the finger down the throat or drinking a large quantity of warm water are usually effective. A teaspoonful of mustard or salt in a cupful of warm water are household remedies of value and the wine or syrup of ipecac is usually easily procured. The last are given in doses of from one to two teaspoonsful.

QUESTIONS

1. What are the different kinds of bandages?
2. What are the advantages of the triangular bandage for first-aid purposes?
3. What is the size of the triangular bandage?
4. What is the best material for the roller bandage?
5. Sizes of the roller bandage for different parts of the body.
6. What are the spica and the figure-of-8 bandages used for?
7. How would you make a four-tailed bandage?
8. What precautions must be taken in putting on bandages?
9. For what purposes are bandages used?
10. Why should you not use adhesive plaster?
11. What does a wound dressing consist of?
12. Describe the Red Cross First-aid Outfit.
13. What about washing wounds?

14. Describe the use of iodine.
15. Why may it be dangerous to put plaster or collodion on a wound?
16. Tell how splints are used.
17. What are tourniquets used for and what are their dangers?
18. Explain the use of heat and cold in first-aid work.
19. What stimulants are best for the first aider to give?
20. What is an emetic? Name a good one.

PRACTICAL EXERCISES

Show the different bandages and how the triangular bandage is used, unfolded, folded and as a cravat.

Put bandages on the different parts of the body and show how they are used to keep splints and dressings in place and as slings.

Illustrate the use of a tourniquet.

As much practice in bandaging by the class as time permits.

CHAPTER V

GENERAL DIRECTIONS FOR GIVING FIRST AID— SHOCK

General Directions for Giving First Aid

In actually giving first aid several points must be taken into account. In case of accident or sudden illness when no doctor is present the man or woman trained in first-aid work occupies for the time being the same position as a physician. For this reason in justice to his patient and to himself he must take control of matters. In a crowd, well meaning and sympathetic but ignorant people will almost always be found, who in their desire to help may actually do a great deal of harm if they are permitted to interfere. Some firmness will be necessary to get rid of them and of the merely curious. By the exercise of tact, there will usually be no great difficulty in getting a patient in one's own charge. The patient's recovery always depends to some extent on his having plenty of fresh air, so persons should be told this and requested to clear a space around him. The only persons who should be near a patient are those actually needed to help him.

Be observant. Everything depends upon this. See everything and think what each thing means. Then you can hardly go wrong in caring for the patient.

Be calm and don't be hurried. Be quiet and cool. Be gentle and considerate.

If a doctor is within immediate call it may not be necessary for the first aider to do more than to send for the doctor and to keep the crowd away from the injured person. The action taken depends on the injury, however; for example, it would be very foolish to wait a moment for a doctor if there were danger of death from bleeding or in any accident where delay would be

dangerous. On the other hand, often it may be better to have a doctor care for the injury from the first. As has been previously stated, in giving first aid it is quite as necessary to know what *not* to do as what to do. In any case if the services of a doctor can be had it is always best to employ them, except for slight injuries. Moreover, if any doubt exists in regard to this, it is best to send for a physician or to take the injured person to a doctor as soon as possible. It should be remembered that injuries which are apparently trivial may sometimes, if not treated promptly by a doctor, have serious consequences, and that a physician called in time may prevent conditions which when fully established are beyond the help of medical science.

Tight clothing interferes with both breathing and circulation. The collar should be loosened at once, and also usually the belt, likewise anything else around the body which is tight.

If something special does not need immediate attention, one of the first things to do is to get the injured person into a safe and comfortable position. The best position, unless there is some reason to the contrary, is on the back with the head low. With a flushed face, the head may be raised on a small pillow or folded coat; with a pale face, it should not be raised at all. If a person is vomiting, he should be placed on his side or his head should be turned to one side, so that the matter vomited will not go into his windpipe and choke him. Unconscious persons cannot swallow and so they should never be given water, stimulants, etc., as these will choke them by entering the windpipe. Slight cases of illness and injury may sit up, but one must be sure that all seriously injured are kept lying down.

Do not be hurried into moving a person from the place where his accident has occurred and always make sure first that he is not going to be injured further by being moved. It is especially dangerous to move persons with broken bones before proper treatment has been given as the ends of the broken bones are very sharp and cut like a knife.

A hurt person will frequently ask for water, which may be given with perfect safety. Cold water is usually more refreshing, but whether cold or hot, it must be given fairly slowly so that the

injured person has time to swallow between sips. The first thought with many people is to give whiskey or brandy. This is not necessary and may do a great deal of harm. First-aid stimulants are, however, often required for shock.

Whatever the injury may be, it must be seen clearly before any attempt is made to treat it. In order to do this it will generally be necessary to remove some of the clothing. This is likely to be very painful and possibly dangerous for the injured person, unless he is handled with the greatest gentleness. In removing clothing, rip up the nearest seam in the outer clothing and cut or tear the underclothing. The sound side should be undressed first so that the injured side will be subjected to less movement. In injuries to the foot and ankle it will rarely be possible to remove the boots or shoes without giving severe pain and perhaps doing considerable damage, so they should be cut freely when this is necessary. Generally speaking, an injured person should be covered warmly and not exposed more than absolutely necessary as loss of the body heat increases shock.

The first aider must make use of what he finds on the spot and an important thing to learn is how to improvise what he needs. He must explain clearly to any helpers just what he wants them to do.

When there are several injuries the most severe should be cared for first.

Treat Shock.

Shock

More or less shock is caused by *all* injuries and it must be thought of, and treated when necessary.

Description.—Shock is a more or less profound depression of the nervous system. It is sometimes called collapse or prostration.

For the convenience of the student the human body is divided into various systems. One of these and the most important as it regulates the action of all the others, is the nervous system. This is a very delicate system which is easily disturbed. Everybody knows what a mental shock is. A person receives bad news, for

example, he grows pale, perhaps is unable to move, or even becomes half conscious or totally unconscious and may die. We say he has received a shock. This is exactly what happens as the result of an injury. That is to say, shock always, whatever the cause, is a more or less severe depression of the nervous system.

Causes.—Usually a severe injury. Some persons are sensitive to shock, however, and so with them more shock will follow a slight injury than is the case with a severe injury in less sensitive persons.

Prevention.—The prevention of accidents, especially severe accidents. Also do not allow an injured person to see his own injury, as this is apt to increase shock. This is especially true with severe bleeding.

Symptoms.—(This is a word whose meaning should be known to every first aider. Symptoms are everything that an injured or ill person shows or feels because of an injury or disease.) Suppose we first consider a case of severe shock. A person is injured by being struck in the abdomen by the pole of a wagon. The internal organs do not appear to be hurt but, nevertheless, immediately after the accident his appearance becomes alarming.

He lies perfectly quiet and pays no attention to what is happening around him. He stares perfectly straight before him. His pupils are large. His skin is as pale as marble. His hands and lips have a bluish tinge. Large drops of sweat hang on his forehead and eyebrows. His whole body is cold.

He is not nearly as sensitive as usual. He pays no attention to pinching his skin unless the pinch is very severe and then he will make a wry face and perhaps a languid defensive movement.

If a limb is lifted and then let go it will fall as if dead.

The pulse is almost imperceptible and very rapid.

The shocked person is conscious but replies slowly and only when repeatedly questioned.

On being asked how he feels, he complains of cold, faintness and deadness in his limbs.

His breathing is changed. He takes long, deep sighing breaths alternated with very shallow ones.

He may vomit and then be nauseated and have hiccoughs.

It should be noted here that shock is not necessarily as severe as that described. It varies from this to nothing more than momentary paleness, weakness and perhaps some temporary confusion of the thoughts.

Usually shock is recovered from, the improvement being gradual, but the shock may grow worse and death finally occur.

It might be thought any one should easily know when a person is suffering from shock. This is the case usually but not invariably. If you see the accident and its effect you can hardly make a mistake, but suppose you do not see the accident then you may have nothing to judge by except the symptoms just given.

Treatment.—Send for a doctor at once. Shock is too serious a condition for you to try to treat yourself unless it is very slight. But do not wait for the doctor to come before beginning treatment.

It would be a fine thing if we had some drug which would cure shock. But no such drug has yet been discovered. This being the case what we must do is to get as much blood to the brain as possible. For on a good supply to the brain depends the recovery of the nervous system from its depression, and renewed control of the arteries. Moreover, at the same time, we must be careful to prevent anything which will increase shock.

Position, stimulants and warmth are the important things on which we must rely in treating shock.

Position.—First, place the shocked person on his back with his head low so that the blood will tend to run into his brain. A good way to do this is to raise the foot of the bed or bench on which he is lying. Never raise the head of a shocked person on a pillow.

Stimulants.—They should always be given by the mouth if the shocked person is able to swallow. As stated, the best first-aid stimulant is aromatic spirits of ammonia. Give a half teaspoonful in one-half a glass of water, preferably hot water. The exact amount is not very important, however. That is to say you need not be very particular in measuring it out. A full tea-

spoonful will not be too much. It may be repeated in half an hour and should be when recovery from shock is not apparent. Other good first-aid stimulants, as stated elsewhere, are hot coffee, hot tea, hot beef tea, hot milk or even in the absence of other stimulants hot water. About a cupful of one of these drinks should be given and like the ammonia they should be repeated in half an hour if necessary.

Also employ as stimulants the ordinary water of ammonia, hartshorn, or smelling salts. These are used, of course, by holding the bottle containing one or another of them under the nose so the fumes will be breathed in. You should allow the shocked person to breathe them in from time to time. Be careful not to spill them on his face as they burn in concentrated solution. As unconscious persons cannot swallow, for them the inhaled stimulant is particularly useful.

Heat as a very valuable stimulant has already been discussed.

While hot-water bags and bottles and hot bricks or stones are usually most convenient, flannels wrung out in hot water and applied to the abdomen and chest also afford a good means of applying heat.

Rubbing the legs and arms toward the body is also a good stimulant. This is valuable for another reason; such rubbing quickens the circulation of the blood.

The different stimulants are best used together when they can be obtained.

Warmth.—Loss of the body heat always increases shock. So we must guard against this. Never remove more clothing than necessary from an injured person and when possible spread blankets or coats over him. Be careful while rubbing him that he is not uncovered. A warm room is much better for a person in shock than a cold one.

Warning.—While shock is so extremely common in injuries that it should always be kept in mind and treated, it must not be forgotten that something more dangerous than shock may require attention. The symptoms of severe bleeding are very like shock, and if shock only is treated in such a case and the bleeding is not stopped the patient may bleed to death.

QUESTIONS

1. Suppose you have to care for an injured person. What would you do first?
2. When should you send for a doctor, or take the injured person to a doctor?
3. What about tight clothing?
4. When would you move an injured person?
5. What are the dangers of moving an injured person?
6. What do you know about giving injured persons water; stimulants?
7. Should clothing always be removed?
8. When would you remove some of the clothing and how would you do this?
9. When does shock occur?
10. What is shock? Cause of shock? Prevention? Symptoms? Treatment? What is a symptom?
11. Suppose you see a person whom you think is severely shocked, what would you look for in order to determine nothing more severe than shock had occurred?
12. Explain the use of stimulants, and position in shock.

PRACTICAL EXERCISES

Have one of the class pretend to be injured, or secure some one else to act as "subject." Members of the class should be required to show just what they would do. They should also be required to loosen and to remove clothing, the place of the injury having been stated. They should place the injured person in the proper position. The pupil of the eye should be demonstrated and each member of the class should be required to take the pulse.

Show on the subject exactly what should be done in shock.

CHAPTER VI

INJURIES IN WHICH THE SKIN IS NOT PIERCED OR BROKEN

BRUISES, STRAINS, SPRAINS, DISLOCATIONS AND FRACTURES

Causes.—These injuries are all caused by external violence in the form of blows or falls or by wrenching the body.

This does not apply to all compound fractures,¹ however, as will be seen later.

Prevention.—Every one is liable to these, the commonest of injuries, and they occur under so many different circumstances that it is impossible to suggest other than the most general means for preventing them. It is safe to say, however, that a great many of them result from carelessness and that especially in dangerous places, such as the crowded streets of a city, people should be more alive to their surroundings. In other words, they should always exercise common care.

Many common practices, such as jumping on and off trolley cars in motion, frequently cause such injuries, and the more general observance of posted directions in all situations will well repay the public. Such directions are not arbitrary, as they are, unfortunately, sometimes regarded, but represent the teachings of experience.

BRUISES

Description.—These are the most common injuries. When a person falls and strikes some part of his body or when he is

¹Compound fractures are more conveniently described under fractures, though properly they are wounds and first require to be treated as wounds and not as fractures.

struck by something, usually the skin is not broken but the force of the blow or fall injures the tissues immediately beneath the skin breaking numbers of small blood-vessels therein. Blood escapes from these small vessels and this causes the swelling and the ordinary black-and-blue spot which is due to the blood which has escaped.

Causes.—Blows or falls.

Symptoms.—Pain at once from injury to nerves. Swelling from escape of blood from vessels. Black-and-blue spot from same cause. Pain also later from pressure of this blood on sensitive nerves. Pain increased by movement.

Treatment.—Slight, no treatment. More severe, object is to limit swelling and to decrease pain. At once: Ice or very hot or very cold water, or half alcohol and half water. Arnica or witch-hazel. These contract blood-vessels and so prevent escape of more blood and also deaden nerves to some extent, thus relieving pain. Ice may be applied directly to injured part. Best in using liquid remedy to wet cloth with liquid and then to apply cloth. Raising bruised part diminishes pain, as it diminishes the blood-supply to the part. In arm, when severe and movement is painful, use a sling. No doctor is usually required for a bruise.

Warning.—A bruise may be only the least important part of an injury. So with a bruise always try to make sure there is no other injury, such as a fracture.

Bruises of the chest and abdomen sometimes result in internal injuries. They may be very dangerous from breaking of the blood-vessels of the lungs, of the abdominal organs, or from actual rupture of the soft internal structures. Severe bruises of this character therefore demand the immediate attention of a physician. In case shock is very severe after a bruise of the abdomen or chest, serious injury of the internal organs should be suspected.

STRAINS

Description.—A strain is the name given to the injury produced by overstretching of a muscle. In severe strains small

blood-vessels in the muscles are often broken so that blood escapes into the muscles in the same way that with a bruise blood escapes beneath the skin. The commonest strains are of the muscles of the back and shoulders and of the small tendons of the wrist and ankle.

Cause.—Usually a sudden wrench—may be due to lifting too heavy a weight.

Symptoms.—Pain increased on movement. Stiffness. Lameness. More or less swelling.

Treatment.—Not necessary to call doctor unless severe. Absolute rest at first. Alcohol and water, arnica and witch-hazel gently rubbed in to deaden pain. Rubbing should always be toward body. Later such rubbing may be harder to help absorption and to make strained muscles more supple. When pain and stiffness have improved, gentle movement until both have entirely disappeared.

SPRAINS

Description.—Sprains are injuries of joints. They result from violent stretching, twisting and partial breaking of the ligaments about a joint and are sometimes accompanied by actual breaking of the bones. The twisting or stretching results in breaking of the blood-vessels and the escape of blood and of blood-serum (the liquid part of the blood) both around and in the joint. Sprains of the wrist and ankle are most common.

Cause.—Unnatural movement of a joint. Sometimes the cause is apparently a slight one, such as twisting the foot in stepping from the curb to the street.

Symptoms.—Severe pain immediately. Pain is much increased by movement of the joint. Swelling of joint. Bones are not out of place and there is no deformity other than that due to swelling. Shock, when severe.

Treatment.—Call doctor always when severe or when in doubt. Always begin treatment at once whether doctor has been called or not. Absolute rest in order not to do more damage by rubbing of the injured joint surfaces together. This means that the

patient should not be allowed to move the joint or to step on it. Elevate joint when possible and apply heat or cold. Less blood will come to the injured joint if it is elevated and heat or cold contracts the vessels and thus limits the escape of blood and serum. Cold may be applied in the form of snow or crushed ice in a cloth. It is usually better to use cloths wrung out in very hot or very cold water or to shower the joint with very hot or cold water. Putting sprained joint under a cold or hot water tap is also excellent. Either heat or cold should be made use of sufficiently long to get full benefit from it, that is to say, for some hours. At first on the application of either heat or cold, the pain may increase, but after an hour, at the latest, it will commence to improve and will finally disappear. Remember there may be shock and, if so, treat.

Warning.—A severe sprain, especially a sprain of the ankle, is by no means a trivial injury but one which demands the services of a physician.

DISLOCATIONS

Description.—Dislocations are injuries of joints and are due to the head of a bone slipping out of its socket. A dislocation cannot occur, except in a joint which has been dislocated before, without tearing the ligaments which keep the joint close. Some persons, however, on account of frequent dislocations of the same joint have its ligaments so stretched that not only is dislocation easy, but not further injury of the ligaments results from it. By far the most frequent dislocation is that of the shoulder-joint, which occurs in one-half of all cases of dislocation. But dislocations of the hip-joint, the jaw and the fingers are not particularly uncommon.

Causes.—Dislocations are usually caused by a blow or a fall, but sometimes result from a violent muscular effect, such as throwing a ball.

Symptoms.—Deformity; that is, the joint has an unusual appearance, because the head of the bone is not in its proper place. This may be best recognized by comparing the injured

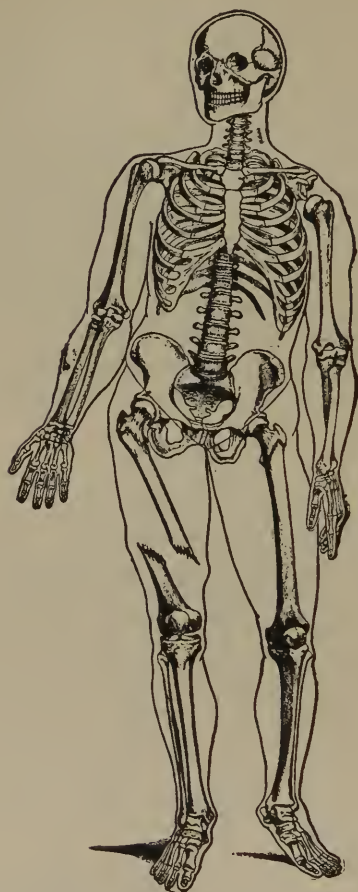


PLATE XIV.—Dislocation and fracture.

with the uninjured side of the body. The limb in which a joint is dislocated may be either longer or shorter than the uninjured limb. This depends on the direction in which the dislocation has taken place. The head of a dislocated bone may often be felt out of its place. Limited movement as the displaced head of the bone is tightly held in its new position. Pain from pressure of the displaced head of the bone on sensitive nerves. Swelling from bruising of the soft parts by the displaced head of the bone. Shock.

Treatment.—Send for a doctor at once. Treat shock if necessary. Await his arrival except in dislocations of the jaw, the fingers and the shoulder without attempting to reduce dislocation. Remember that attempts to reduce dislocations, other than those of the fingers and the jaw, by one not familiar with anatomy may result in great harm to the patient, for the movement necessary to do so may cause serious injury to the blood-vessels, nerves and soft parts. When no attempt is made to reduce the dislocation, the patient should be put in a comfortable position and the injured joint should be covered with cloths wrung out in very hot or very cold water so as to contract the vessels and to prevent swelling as much as possible.

Dislocation of the Lower Jaw

This may usually be successfully treated by almost any one. This is fortunate, as a dislocated jaw with the open mouth in consequence is most painful and uncomfortable. To reduce a dislocation of the jaw, both thumbs must first be wrapped in several layers of cloth so that they will not be liable to injury. Both thumbs are then placed in the patient's mouth resting on his lower teeth on each side while the fingers seize the lower jaw outside. First pressure is made downward and then backward. As soon as the jaw starts into place the thumbs should be slid off the teeth to the inside of the cheeks or they will be caught between the teeth when the jaw springs into place. The over-stretched muscles act just like a rubber band and one must be quick or his thumbs will be injured. When dislocation is reduced put on jaw bandage.

Dislocation of the Fingers

These, not including those of the second joint of the thumb, present no great difficulties to the first-aid student. The dislocated finger should first be grasped firmly on the hand side. The end of the finger should then be pulled straight out away from the hand and the bone will usually slip into place. No bandage will be required.

Dislocation of the Shoulder

No attempt should be made to reduce this dislocation if the services of a physician can be obtained within a reasonable time, say four hours. Make your decision on this point at once, for if you are compelled by circumstances to attempt to reduce the dislocation you must get to work immediately before the muscles have become set and rigid from the irritation caused by the displaced head of the bone.

Frequently little difficulty will be experienced in reducing a dislocation of the shoulder, especially if the joint has been dislocated before. To accomplish it, the patient should be made to lie down flat on his back. The first aider should then sit down by the side of the injured person. He sits on the injured side facing the patient and so his feet are opposite the dislocated shoulder. Next, the first aider takes off his shoe on the foot nearer the patient's body. This foot is then put in the arm pit of the dislocated shoulder so that it will act as a wedge. Now, grasp the dislocated arm firmly and draw it down at the same time dragging it across the body toward the uninjured side, simultaneously pressing outward and upward with the heel. This will usually pry the end of the dislocated bone outward, and as soon as it is free it will snap back into place. In order to keep the bone in place, the arm should then be bandaged to the side with the forearm carried across the chest and the hand placed on the opposite shoulder.

Warning.—In case difficulty is experienced in reducing any dislocation, do not persist in trying to do so.

FRACTURES

Description.—When a bone is broken, the injury is called a fracture. Our bones are brittle and when the force used against them is sufficient they break much as would a dry stick. Fractures are among the commonest injuries, ten times as common as dislocations. About two-thirds of all fractures are of the bones of the limbs. Next in frequency are those of the collar-bone and ribs. Fractures of the skull, spine and pelvis are comparatively rare.

There are two kinds of fractures: simple and compound.

A simple fracture is one in which the skin is not pierced.

A compound fracture is one in which the skin is pierced.

Causes.—Simple: blows and falls. Compound: also—from bad handling of simple fractures and from wounds.

Prevention.—Simple: as given under general heading. Compound: also—by proper handling of simple fractures and the prevention of wounds.

Symptoms. Simple Fracture.—The injured person has had a blow or fall. Pain at point of fracture. Tenderness at point of fracture. Person injured is unable to move fractured limb. Deformity. With a fracture a limb will be altered in shape and shortened or bent. Always compare with the uninjured side. Recognition by touch, an inequality may often be felt by running finger along a broken bone. Loss of rigidity of bone. On moving a limb in which bone is fractured, instead of the bone being moved as a whole it will be noticed that at the point of fracture there is unusual movement, something like that of a hinge. Crepitus. This is the surgical term applied to the grating which is heard or felt when the broken ends of the bone are rubbed on each other. Shock.

Warning.—As one may do great harm by moving a broken bone, for the broken ends are likely to be very sharp, it is much safer when an injured person is unable to move a limb, and from appearances it seems probable that a fracture has occurred, to conclude that it is a fracture without further examination, and to so treat it.

1. Simple Fracture



2. Compound Fracture



5. Splint and Sling for Forearm



4. Fracture of Upper Arm



3. Fracture of Collar Bone

PLATE XV.—Fractures.

Treatment. Simple Fracture.—Send for a doctor. Treat shock. The object of treatment before his arrival is to prevent further injury, especially puncture of the skin by the sharp, knife-like edges of the broken bone. If this occurs the simple fracture is, of course, converted into a compound fracture. In the former injury there is no chance of wound infection as the unbroken skin prevents germs from reaching the break in the bone, while in the latter the skin is cut through and in consequence germs reach the broken bone ends and infection occurs. So instead of the few weeks of comparatively painless healing of the simple fracture without much danger, a compound fracture is caused with probable wound infection, inflammation, pus or matter, and perhaps months of sickness from blood-poisoning, with considerable danger of death. In the treatment of simple fractures your primary object is accomplished by preventing movement of the ends of the broken bone.

If the doctor may be expected to arrive promptly, nothing need be done except to put the patient in a comfortable position. If it is evident that in order to do this the broken bone will be moved, it must be supported firmly by the hands. One hand should support the broken bone on each side of the break. The bone must not bend at the break while the patient changes his position to a more comfortable one. Then the broken bone had best be supported in the natural position on a pillow or a folded coat. In so supporting it great care must be taken that it is not bent or does not drag on the point of fracture.

If the patient must be moved more than slightly, the broken bone should be set; that is to say, it should be gently drawn into its natural position, always determining this by comparing it with the opposite side, and held there firmly by the application of splints.

If the injured person is wearing thin summer clothing, it will not always be necessary to remove the clothing in order to examine for fracture. In fact, it may be better not to try to do so, as this may result in injury from moving the sharp ends of the bone, and when the clothing is left on it furnishes excellent padding for splints. With thick clothing, however, very

likely one will not be able to tell that a fracture has occurred or what the character of the injury is. In this case never try to take off the clothing, but cut it in the seams with a sharp knife or scissors.

Symptoms. Compound Fracture.—Besides the symptoms already described, there is a wound leading down to the broken bone, or the broken end of the bone protrudes through the skin.

Treatment. Compound Fracture.—Send for doctor. Treat shock. Expose fracture by cutting clothing. Turn back clothing from wound. Always treat wound first, then fracture. Do not touch wound with fingers or anything else. As soon as possible procure an antiseptic or surgically clean compress and place it on the wound. Then use same precautions as in simple fracture to prevent movement of sharp ends of broken bone. (Padding and splints.) If sharp bone is buttoned-holed through the skin, as frequently happens, do not attempt to restore it to its place, but after dressing wound hold it in position as it is with splints and a bandage.

Warning.—Never in any fracture attempt to transport patient until broken bone is firmly fixed in position by splints.

SPECIAL FRACTURES

Fracture of Upper Arm and Forearm

Symptoms.—These fractures can almost always be easily detected by the symptoms already given.

Treatment.—Send for doctor. Treat shock. Gently straighten limb so as to put it in natural position. Secure two splints long enough, in upper arm to extend from shoulder and arm-pit to elbow, and in forearm from elbow to tips of fingers. These are best flat boards, shingles are excellent, but may be of any stiff material, such as twigs, cover of wine bottles, tin trough, etc. Pad splints well. In upper arm, apply one splint to inner and the other to outer side of arm. Support by sling. In forearm: Place fore arm across the chest, thumb up. Apply one padded splint—clothing will do for padding—to outer side from elbow

to beyond wrist and the other to inner surface extending to tips of fingers. Support by sling.

Broken Wrist

This is an extremely common injury resulting from a fall on the hands which are put out in falling forward to protect the body.

Symptoms.—This commonly is the kind of fracture to which the name impacted is given. The force of the injury actually drives one bone into the other so that they are held together. Great deformity, no crepitus, movement, etc.

Treatment.—Send for doctor. Treat shock. Do not attempt to free bones, but leave them as they are. Otherwise treat like fracture of forearm. And if not impacted so treat.

Broken Fingers

Symptoms.—Usual symptoms of fracture, which is easily detected.

Treatment.—Gently draw into natural position. Put narrow padded splint under finger and hold it in place with a narrow bandage. Support hand in sling. Show to doctor as soon as practicable.

Crushed Hand or Foot

Symptoms.—Are usually due to a heavy weight falling on or passing over the hand or foot. Many or few of the bones of the wrist and hand or the foot and ankle may be crushed. Usual symptoms of fracture. Much pain. Great swelling.

Treatment.—Hand: Apply a padded splint to the front of the hand. This should be as wide as the hand and long enough to go from the middle of the forearm to beyond the tips of the fingers.

Foot: Remove shoe. Padded splint, bottom of foot from heel to toes. A figure-of-8 bandage will be found most convenient to hold this in place. Raising foot will relieve pain.

Fracture of Lower Leg

Symptoms.—As given above, injured person falls to ground. Is not usually difficult to detect fracture.

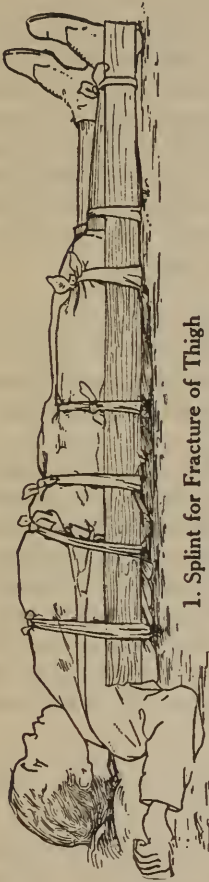
Treatment.—Send for doctor. Treat shock. Secure pillow, sack stuffed like pillow with hay, straw or the like or a blanket rolled on poles at each side so as to make trough. Gently lift leg to pillow or trough, placing one hand above and the other below break under leg, always holding in natural position. Leg on pillow, should not allow toes to turn in or out, but should be supported in same position as toes of uninjured leg.

Nothing further unless must move patient. If this must be done the leg should be drawn into natural position and splinted. Use two splints when procurable. Though any stiff material may be used for these splints, preferably they should be of thin boards longer than the leg so as to prevent movement at the knee-joint, and wider than leg is thick. The splints should be applied outside of pillow, one at the inner and the other at outer side of leg. They should be held in place by 3 or 4 strips of cloth, straps or handkerchiefs passed around splints, pillow and leg and tied. Care must be taken that none of these strips is directly over break, as this will cause intense pain by pressure. The pillow alone makes a fairly good support even without splints. Splints also may be used without a pillow. If this is done the clothing, straw, hay, cotton, leaves or something else soft must be used for padding under the splints, which are tied in place in the way described above. In case of emergency anything stiff of sufficient length, such as a cane, umbrella or the like, may be used for the outer splint, the other leg being used for the inner splint. The strips of cloth or handkerchiefs are then passed around the splint and both legs and tied as before.

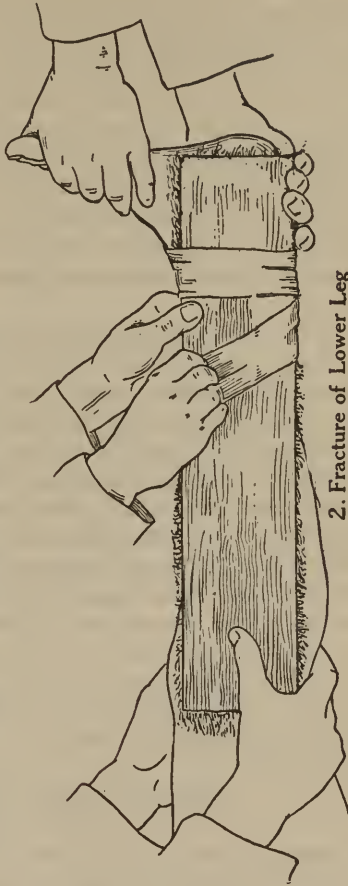
Fracture of Thigh

Symptoms.—As above, patient falls to ground. May be difficult to detect fracture on account of thick muscles.

Treatment.—The necessity of procuring a physician and of



1. Splint for Fracture of Thigh



2. Fracture of Lower Leg

treating shock are greater than in fracture of the leg. Remarks in reference to careful handling of broken bone apply. If difficult to detect fracture, treat as fracture.

A long splint extending in a solid piece from foot to arm-pit is required for outside splint to prevent movement of hip-joint. This should be firmly fixed by encircling strips of cloth to the body as well as to the limb. Seven strips will be required. The body should not be moved while putting strips in place and this can be prevented by a clever trick. If a stick is used to push the body strips under the hollow of the back they may subsequently be pulled in place without moving the body at all.

Inner splint had best extend from crotch to foot. If no inner splint can be obtained, tie legs and thighs together.

Broken Knee-cap

Symptoms.—As above, patient falls to ground and cannot raise leg. Not difficult to detect fracture, as can feel groove in knee-cap immediately beneath the skin.

Treatment.—Services of a physician will be required and shock generally demands treatment. Must also use care in moving leg. Straighten leg. Secure splint long enough to extend from middle of thigh to middle of lower leg. Preferably, this should be a thin board as wide as thigh, but a cane, umbrella or the like may be used in case of emergency. Make pad for splint, apply splint to back of thigh and leg with middle opposite bend of knee and tie in place with strips of cloth or handkerchiefs. Be careful not to put bandage over break, but one strip immediately above and one immediately below knee.

Fracture of Collar-bone

Symptoms.—Patient supports elbow of injured side with hand of other side. Is unable to raise arm above shoulder. Is easy to feel depression by running finger over injured collar-bone.

Treatment.—Send for doctor. Treat shock. Make pad from a large handkerchief, two medium sized handkerchiefs, a

triangular bandage or the like. Place this pad in arm-pit of injured side. Put arm in sling with forearm at right angle to upper arm. Take a bandage about 3 inches wide, put this horizontally around body and injured arm at elbow. It will, of course, encircle both the elbow, the bent arm and the body. When tied, by pulling elbow to body it will force upper end of humerus outward and thus prevent broken end of collar-bone from overlapping.

Another method: Have patient lie down and place his injured shoulder on pillow in a comfortable position till doctor arrives. Treat shock.

Fracture of Ribs

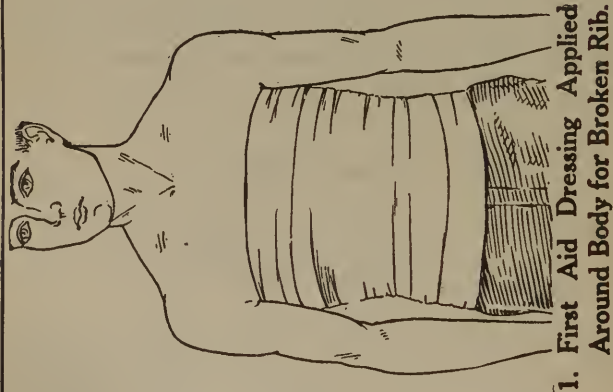
Symptoms.—Sharp pain on taking a long breath or coughing. Breathing is usually short, patient often presses hand to side to prevent movement of chest. May feel grating of ends of broken bones on each other by placing hand on chest at point where pain is most severe.

Treatment.—Tie a large handkerchief or a triangular bandage firmly around the chest, pin a large towel snugly around chest or apply a roller bandage to chest. These limit chest motion and thus diminish pain. If shock is severe, call doctor immediately. If not, after bandage is in place may visit a doctor as soon as practicable. Treat shock.

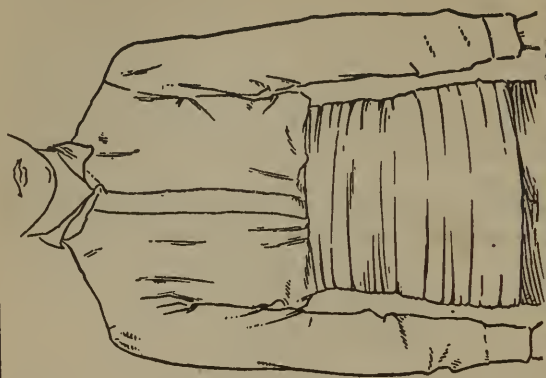
Fracture of Skull

Symptoms.—Patient probably unconscious from injury to brain. If at base of skull, there will probably be a discharge of blood from nose, ears or mouth. If at top of skull, fracture can easily be detected under skin.

Treatment.—Send for doctor. Place in lying-down position with head slightly raised and keep very quiet until doctor arrives. Treat shock but no stimulants unless patient is very weak. If you suspect fracture of skull, so treat.



1. First Aid Dressing Applied
Around Body for Broken Rib.



2. First Aid Bandage Around Hips
for Broken Pelvis.

Fracture of Lower Jaw

Symptoms.—Mouth open, patient speaks with great difficulty. Fracture may often be felt outside, and inside there will be an irregularity of the teeth. May be bleeding from gums. Shock.

Treatment.—Send for doctor. Treat shock. Gently raise broken jaw and bring lower against upper teeth. Support in this position with a jaw bandage or with two strips of bandage, one vertical, tied over top of head and the other longer, brought to back of head, crossed and brought horizontally to forehead and tied there.

Fracture of Nose

Symptoms.—Usually not difficult to detect. Pain, swelling, crepitus and deformity. Swelling may be so great that obscures deformity. Is not infrequently compound.

Treatment.—Put in as natural position as possible and hold there with a bandage over nose and around head across nose from cheek to cheek. Do not pull tight enough to flatten nose. Consult doctor, as there is danger of permanent deformity.

Broken Back

Symptoms.—Patient unable to move. No motion or feeling of body below injury.

Treatment.—Send for doctor at once. If possible, do not move patient before his arrival. Treat shock. If patient must be taken from the spot where his injury has occurred, procure ample assistance to lift him. This should be done with the greatest care so as not to bend spine for this will crush spinal cord. Put litter under patient and gently lower him to litter.

Review

How to tell difference between bruises, strains, sprains, dislocations and fractures:

Accident	Tissue involved	Situation	Symptoms
Bruise.....	Subcutaneous and skin	Any part of body.	Pain, tenderness, discoloration, swelling, little disability.
Strain.....	Muscle..	Any muscle	Pain, increased by movement, tenderness, no discoloration, swelling slight or absent, more disability.
Sprain.....	Joint....	Any joint...	Pain in joint, tenderness of joint, perhaps discoloration, swelling of joint, considerable disability.
Dislocation	Joint....	Any joint...	Pain at or near joint, tenderness, no discoloration, deformity of joint, difference of length of limb as compared with opposite side, total disability, any movement resisted.
Fracture...	Bone....	Any bone...	Pain in bone, tenderness especially at one point, discoloration but not usually at once, bone shortened, total disability, crepitus, too free movement like hinge at point of break.

QUESTIONS

1. Describe bruises.
2. What are the symptoms of bruises?
3. How would you treat them?
4. In a severe bruise what else must you look out for?
5. What is a strain? How is it caused? What are the symptoms?
6. What is the treatment?

7. What is a sprain? How is it caused? Symptoms? Treatment?
8. Is a severe sprain a slight injury?
9. What is a dislocation?
10. How are dislocations caused? Symptoms? Treatment?
11. Under what circumstances would you be justified in trying to reduce a dislocation?
12. When should you proceed to do so?
13. Danger of attempts to reduce dislocation.
14. Describe special treatment for dislocations of the lower jaw, fingers and shoulder.
15. What is a fracture?
16. What is a simple fracture?
17. What is a compound fracture? Causes of simple fractures and of compound fractures?
18. How would you prevent a simple fracture from becoming a compound one?
19. How would you recognize a simple fracture?
20. How would you treat a simple fracture?
21. How would you recognize a compound fracture?
22. Treatment of compound fracture.
23. Symptoms and treatment of fracture of the upper arm and forearm; of wrist; of fingers; crushed hand—foot; of the lower leg; the thigh; of knee-cap; of collar-bone; of ribs; of skull; of lower jaw; of back; of nose.
24. Tell the difference between a bruise, strain, sprain, dislocation and fracture at or near the wrist, ankle, hip, shoulder, etc.

PRACTICAL EXERCISES

Show methods of treatment of dislocations of lower jaw, shoulder and fingers.

Show methods of treatment of a simple fracture.

Show application of splints in fracture of upper arm and forearm; wrist; fingers; crushed hand and foot; fracture of lower leg; the thigh; the knee-cap; collar-bone; ribs; skull; lower jaw; back; nose.

CHAPTER VII

INJURIES IN WHICH THE SKIN IS PIERCED OR BROKEN. WOUNDS

Description of Wounds.—A wound is an injury in which the skin is broken and there is usually more or less damage to the tissues beneath it. This serves to distinguish wounds from the injuries which have just been described (except compound fractures, which are really wounds) for with the former the injury is confined to the tissues underneath the skin. As already explained, in wounds, as the protective covering, the skin, is broken through, there is danger of the entrance of pus germs and consequently of inflammation with the formation of matter or pus. In wounds, too, as blood-vessels are injured, there is more or less hemorrhage or bleeding.

Varieties of Wounds.—1. Cut or incised wounds, in which the skin and underlying tissues are cleanly divided by a sharp instrument. They are caused by razors, sharp knives, glass and the like. To prevent them as with the former class of injuries common care should be exercised. Carelessness on the part of men or women in handling knives or cutting instruments is bad enough, but the limit of carelessness is almost reached in allowing children to have such things. In this variety of wounds, as blood-vessels are cleanly cut across, there is likely to be severe bleeding.

2. Torn or lacerated wounds, in which the tissues are torn rather than cut. They are caused by a tearing or crushing injury such as the blow of a blunt instrument or by being run over or struck by a wagon, trolley or railway car. With them, as the blood-vessels are crushed as well as the other tissues, hemorrhage is not nearly so likely to occur as in the preceding variety, but on account of the character of the injury, dirt is likely to be ground

into the tissues and they are so extensively torn and destroyed that infection followed by inflammation and matter or pus is extremely common.

3. Punctured wounds are deep wounds of small calibre produced by sharp-pointed instruments, such as daggers, bayonets and the like. Wounds caused by bullets are also included in this class. Wounds of this variety are, of course, frequently purposely inflicted, but the great majority of bullet wounds in civil life results from carelessness which is almost, if not quite, criminal. "I didn't know it was loaded" is not sufficient excuse for shooting a fellow being, and if one observes the rule of never pointing a gun or pistol at himself or at any one else he will have no occasion to make this excuse. The amount of bleeding in this variety of wounds is often slight, but may be great if a large blood-vessel is injured. Infection is not uncommon, as pus organisms when carried into such wounds have ideal conditions for multiplication. With punctured wounds as the injury on the surface is trivial one may regard matters far too lightly. For such wounds a doctor should always be consulted.

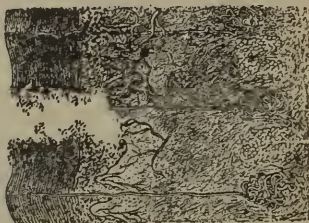
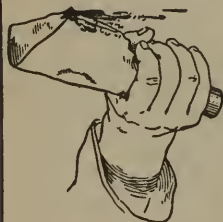
Symptoms of Wounds.—The wound itself. Pain. Bleeding. Shock.

BLEEDING: Practically all wounds bleed more or less, but comparatively few are accompanied by dangerous hemorrhage, as large blood-vessels usually escape injury. Besides the actual appearance of blood in hemorrhage, the loss of a considerable amount of blood gives rise to certain symptoms: Faintness, with cold skin, pale face, dilated pupils, feeble, irregular breathing, sighing, weak pulse, dizziness and loss of consciousness. The severity of the symptoms depends on how much and how rapidly blood is lost.

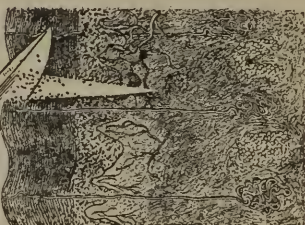
Treatment of Wounds.—This had best be considered under two headings:

1. Treatment of wounds without severe hemorrhage, and
2. Treatment of wounds with severe hemorrhage.

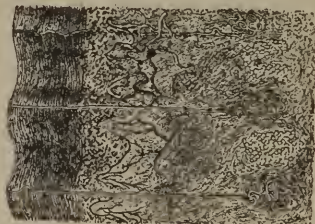
1. **Treatment of Wounds Without Severe Hemorrhage.**—In deep wounds or those which cover a considerable surface, always send for a doctor at once. It is always better to call in a physician



3. Wound Caused by a
Blunt Instrument



2. Showing Clean-cut Wound
Caused by a Sharp Instrument



1. Normal Section of Skin
(magnified)

PLATE XVIII.—Wounds.

DESCRIPTION OF PLATE XVIII.

I. NORMAL SECTION OF SKIN.

(Magnified.)

Note the upper horny layer. This protects the body from the entrance of pus germs which are the very small parasites which cause inflammation, matter or pus and blood poisoning.

2. WOUND CAUSED BY A SHARP INSTRUMENT.

In a wound caused by a sharp instrument, while the protection of the skin is lost, comparatively few germs are carried into the wound. Most of these are washed out by the blood. The very slightly injured cells of the body are able to destroy many others. So such wounds are not as dangerous as ragged, torn wounds. No germs float in the air and there is no danger in exposing wounds to the air.

3. WOUND CAUSED BY A BLUNT INSTRUMENT.

With a blunt instrument many more germs are driven in. The bruising of the tissues of the body makes the cells much less able to destroy the germs and bleeding is not so free. So such wounds are much more likely to be followed by inflammation and the formation of pus or matter than are clean cuts. (Note. The germs have not been carried to the deeper parts of the wound.)

if you doubt your ability or resources. Cut or rip clothing so as to get a view of the wound. Turn back the clothing so it does not touch wound. Do not touch wound yourself or allow wounded person to touch it. Remember there is no hurry, for air will not infect the wound. If a physician may be expected to arrive within a few moments, it will usually be necessary to do nothing further. Exposure to the air is much safer than the application of anything which is not surgically clean or antiseptic. If you have iodine, at once carefully paint all parts of wound which you can reach. And if you have a surgically clean or antiseptic wound dressing—apply it to the wound at once and bandage firmly into place. Do this whether you use iodine or not. This will prevent accidental contamination and will usually stop any bleeding there may be. In fact, this procedure will stop hemorrhage in ninety-nine per cent. of all wounds. Treat shock, if any. If patient is faint, always have him lie down with his head low.

What has been said applies to all kinds of wounds and the treatment given is a good one for the little cuts or scratches which are so common. But these, especially if they do not go through the skin, are rarely dangerous. We do hear from time to time of some one dying from blood-poisoning as the result of the scratch of a pin but many thousand such slight injuries are received which are recovered from without or with treatment. Inflammation of these slight wounds is not particularly uncommon, however, and this should be prevented if possible. They rarely bleed much and making them bleed so that the blood will wash out the germs is the best thing to do first. Do not suck them as very dangerous pus germs are found in the mouth. Squeeze them well at the sides. With a finger it is well to encircle the finger near the hand with the thumb and finger of the other hand and then to work down with strong pressure, pushing all the blood in the finger ahead of the encircling thumb and finger of your other hand. This is sometimes called milking the finger. After the blood has been squeezed out a piece of clean gauze or iodine and gauze makes an excellent dressing. Collodion may safely be used on a shallow, cleanly cut wound but if the wound

becomes inflamed it must be removed as this shows pus germs have been sealed up and are multiplying and producing poison.

2. **Treatment of Wounds with Severe Hemorrhage.**—Check the bleeding. Put injured person in such a position that he will be least affected by the loss of blood. This is lying down with the head low so that the brain will get as much blood as possible. Do nothing which will increase bleeding. Violent movements must be prevented. When once the bleeding has ceased the patient should remain quiet, as any movement may dislodge the clot and start it again. See the wounded person gets plenty of good air, cover him warmly and put hot bottles around him if they can be obtained. Naturally, stimulants increase the force of the heart, so they are undesirable; but sometimes the patient becomes so weak that it is absolutely necessary to give them to prevent him from dying. Whenever possible, always avoid doing so until the bleeding has been checked by some mechanical means. While, as stated elsewhere, aromatic spirits of ammonia is a good stimulant any other stimulant may and should be used if it can be obtained more quickly. When a person is in a state of collapse from loss of blood his death may often be prevented by forcing the blood into the body from the limbs. This is done by raising the feet and bandaging the legs from the toes to the body and by bandaging the arms from the tips of the fingers to the arm-pits.

In order to check the bleeding it is necessary to know from which kind of blood vessel it comes.

1. Arterial hemorrhage is recognized by bright red blood expelled in jets. The blood is lost very rapidly.

2. Venous hemorrhage is recognized by a steady flow of dark blue blood.

3. Capillary hemorrhage is characterized by the oozing of blood of a brick color.

Hemorrhage will not be severe except from arteries and large veins. As arteries, capillaries and veins may all be cut in a wound, there may be bleeding from all three. In this case arterial hemorrhage demands first consideration, and with venous and capillary hemorrhage the latter may be disregarded for the time being.



1. Infection by Handling, or Water



2. How to Care For a Wound
A Clean Dressing

DESCRIPTION OF PLATE XIX.

I. INFECTION BY HANDLING OR WATER.

If the wound is touched by the hand billions of pus germs will be carried into it. If washed with water even more germs will be carried into the wound and not only that, but the deep parts of the wound which previously no germs had reached will have billions of germs carried to them. *Therefore do not handle or wash a wound.* Even if an antiseptic solution is used it will carry pus germs from the skin and deeper than they have been before and no antiseptic such as bichloride of mercury can be used strong enough to kill these germs, as it will then also destroy the cells of the body and so make them less able to fight the germs. Peroxide is specially dangerous in deep wounds as it carries pus germs everywhere and is not strong enough to destroy them.

2. HOW TO CARE FOR A WOUND.

Placing a clean dressing, which means a dressing that has been sterilized surgically (such as the Red Cross Dressing) on the wound will introduce no more germs and will not injure the delicate tissues of the body, exposed in the wound. Moreover, the flow of blood and blood serum (the liquid part of the blood) will be in the direction of the dressing, so the germs will be constantly going out.

This, therefore, is the way to take care of a wound.

Arterial Hemorrhage

Treatment.—Send for a doctor at once. Do not wait for him, for by so doing the patient may be dead or in a hopeless condition when he arrives. If necessary, cut off clothing at once so as to see bleeding point. In very severe hemorrhage proceed with next step before doing this. Press with your fingers or thumb on the artery between the bleeding point and the heart. This stops the bleeding just as you can check the water flowing from a hose by pressure in any part of its length. It does more than this, however, Nature's method of checking any hemorrhage is by the formation of a clot, and as pressure prevents the washing away of the blood beyond the point of pressure an opportunity is given for a clot to form. The points where pressure can best be made on arteries have already been given, but it will be best to review this subject:

Bleeding from any part of the scalp may be stopped by a tight bandage around the head. The bandage should encircle the head, going across the forehead just above the ears to the back of the head behind.

Bleeding from the side of the head above may also be stopped by pressure on the temporal artery in front of the ear just above where the lower jaw may be felt working in its socket.

All arterial bleeding from the head except that already referred to and from the neck above had best be checked by pressure on the carotid artery. To make such pressure press backward with the thumb or fingers deeply into the neck just to the inner side of the plainly seen muscle which reaches from the upper part of the breast bone to behind the ear.

Wounds of the neck whether from arteries or veins are so immediately and extremely dangerous, that for them direct pressure on the bleeding point should be resorted to at once.

In bleeding from wounds of the shoulder or arm-pit, the subclavian artery may be reached by pressing the thumb deeply into the hollow just above and behind the center of the collarbone. (Plate XX.)

In bleeding from any part of the arm or hand, the brachial



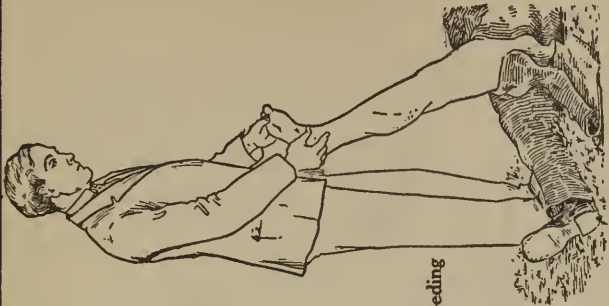
1. Point of Pressure on Carotid Artery
for cut above



2. Point of Pressure on
Subclavian Artery



3. Pad on Temporal
Artery.



4. Checking Arterial Bleeding
by Position

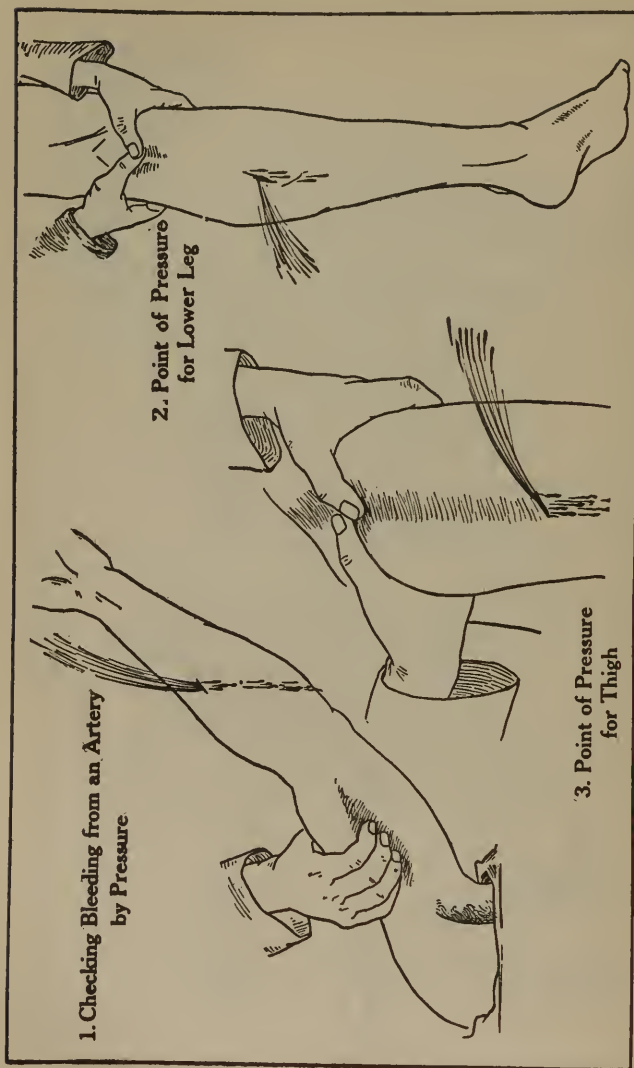


PLATE XXI.—Stopping bleeding.

artery is usually pressed outward against the bone just behind the inner border of the large muscle of the upper arm. (Plate XXI). This artery runs about with the seam of the coat.

Another method is to put a firm pad of gauze or cloth about the size of a small egg at the bend of the elbow, to close the joint tight and to bandage in this position.

For the hand alone, pressure on the pulse at the outer side of the wrist and at the same place at the inner side will stop bleeding. Two little pads may be used for this.

While bleeding in the palm may be checked in these ways. direct pressure by means of a stone wrapped in gauze or the like firmly bandaged in the palm with a hand closed upon it is much better.

In bleeding from the thigh, leg or foot, press backward with the thumbs at the middle of the groin where the artery passes over the bone. This is four finger breadths below the fold of the groin.

For bleeding below the knee, a pad about the size of a billiard ball is placed in the bend of the knee, the joint is bent on it and is bandaged in this position just as is done in the elbow-joint.

In making pressure with the fingers, if you feel the beat of the artery, you may be quite sure that with a little care to get it between your fingers and a hard point you can check the bleeding. If you have stopped the bleeding in the manner just described, you may also be quite sure that the patient is safe so long as you continue the pressure.

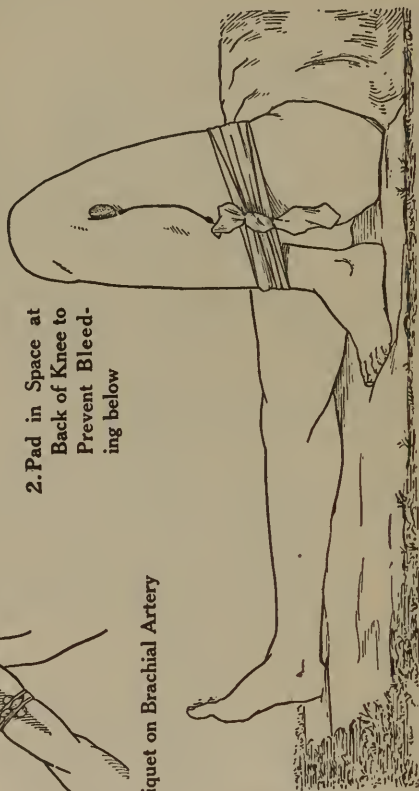
You will hardly be able to do this for more than ten or fifteen minutes, however, as your fingers will become tired and cramped. It will be best, therefore, in wounds of the extremities to have a tourniquet made to place around the limb against your fingers with the pad on the artery; the tourniquet then to be twisted; or in proper cases the elbow or knee pads may be used in place of the tourniquet. In severe abdominal bleeding a coat or pillow should be crowded down on the abdomen.

One of these methods—the tourniquet or pad, will usually be all that is necessary if the services of a doctor can be procured within two or three hours. If this is not the case you will be in



1. Tourniquet on Brachial Artery

2. Pad in Space at
Back of Knee to
Prevent Bleed-
ing below



a serious position. If either apparatus is left in place much longer than this there is considerable danger from cutting off the blood-supply that you will cause the death of the part below. No part of the body can do without blood for a long period. Yet if the pressure is removed the bleeding may recommence. Under such circumstances, therefore, leave the tourniquet or pad in position as long as you dare, say two hours. In the meantime procure an antiseptic compress or have one prepared in the manner already described. Place this gently on the wound and bandage firmly in place so as to make strong pressure on the bleeding point. The pressure between the heart and the wound may now be gradually released. If the bleeding does not recommence, well and good; if it does, the tourniquet or pad must be reapplied. Another attempt to remove it should not be made for at least an hour, as time is needed for the clot to reform.

Suppose, at first, and this is not wholly improbable, that you have failed to stop the bleeding by pressure between the heart and the bleeding point—there is still no reason why you should become panic stricken. Of course you do not want to put your fingers in the wound as this will be very likely to infect it, but in case of a severe arterial hemorrhage which you are unable to check by pressure between the heart and the bleeding point you must at once make pressure on the cut artery in the wound. If you have an antiseptic compress or a surgically clean cloth to put over your fingers, which are used to make direct pressure, so much the better, as this will prevent infection; but do not wait to obtain it. When direct pressure is made in this way, it should be replaced, if possible, by a compress bandaged in place in the manner which has already been described.

With wounds of the smaller arteries if a compress is firmly bandaged on the wound at the beginning it will often be all that is required to check bleeding. Position is also of value in stopping such hemorrhage. By elevating the arm or leg the heart is made to pump against gravity and a much better chance is given for a clot to form which will block the injured artery.

Venous Hemorrhage

(Large Veins)

Treatment.—Stopping bleeding of this character is rather simple as compared with checking arterial hemorrhage. Send for a doctor. Remove any bands, such as tight collars, belts, garters and clothing which prevent the return flow of blood to the heart. If a limb be wounded, elevate it so as to assist the flow of blood back to the heart. Apply a compress directly to wound and bandage on tightly. If no compress can be obtained which is surgically clean or antiseptic, if bleeding is very severe it will be necessary to make direct pressure in the wound with the fingers. This will, of course, be done at the risk of infecting the wound. If possible, keep wounded part in an elevated position for some hours after bleeding has stopped. With wounds of the neck, such as those caused in an attempt to cut the throat, some of the jugular veins are often divided. It is quite probable in such a case that death will occur before anything can be done. If not, jam the fingers on the bleeding point at once and replace them with a compress at your leisure. This compress should be bandaged tightly in place.

Varicose veins are veins which have become very large from weakening of their walls. Only those of the legs need be considered here. They may burst from injury or without an injury, causing serious or even fatal hemorrhage if they are not given prompt attention.

Send for a doctor at once. Put patient on his back. Remove all bands around leg above bleeding point. Raise leg. Cut and rip clothing so as to get at bleeding point. Turn back clothing from wound.

Place surgically clean or antiseptic compress on bleeding point and bandage firmly in position, or when absolutely necessary use fingers first for direct pressure on the bleeding point and replace them by a clean compress. Keep patient lying down for some hours with the leg elevated.

If there has been considerable loss of blood, cover patient warmly and place hot bottles around him. Give stimulants

only when absolutely necessary to prevent death, as they will increase the force of the heart and so the bleeding.

Internal Hemorrhage

May result either from a deep wound which cuts a large blood-vessel of one of the internal organs or from the bursting of a blood vessel of the lungs or stomach.

Symptoms.—Those of hemorrhage, but as the bleeding is internal it will not be seen.

Treatment.—Send for a doctor at once. Put patient in a lying-down position immediately, with his head lower than his body. Apply ice or cloths wrung out in very cold water to the point from which you think the bleeding comes. To distinguish between bleeding from the lungs and stomach, remember that from the former the blood is bright red and frothy and is coughed up, while from the latter it is dark and is vomited. Give stimulants only when patient is becoming very weak.

Nose-bleed

Usually this does not result from a wound, but comes on spontaneously. Slight nose-bleed does not require treatment, as no harm will result from it.

Treatment. Severe.—Place patient in a chair with his head hanging backward. Loosen collar and anything tight around the neck. Apply cold to the back of the neck by means of a key or of a cloth wrung out in cold water. Put a roll of paper under the upper lip between it and the gum. If bleeding does not cease, salt and water, a teaspoonful of salt or vinegar to a cupful of water, should be snuffed up the nose. If bleeding still continues, send for a doctor to come at once. Before his arrival place a small piece of cotton or gauze in the nostril from which the blood comes and shove it in gently for about one inch. A pencil answers very well to push this plug in. Pinching the soft part of the nose below the bone will also help to stop bleeding. Stimulants should be used only as in the other classes of hemorrhage.

SPECIAL WOUNDS

Abdominal Wounds.—All wounds should be treated on the general principles already described. A word or two is required, however, on the subject of abdominal wounds in which more or less of the abdominal contents escape through a large cut. Send for a doctor at once. Place a clean cloth over the wound and keep it constantly wet with a weak solution of salt and water, for if these delicate structures become dry they will suffer almost fatal damage from this cause alone. Treat shock.

Wounds in Which Foreign Bodies Remain

Treatment.—Such bodies should be gently pulled from the wound in a direction contrary to that in which they entered. If they are of considerable size and have damaged the tissues a good deal, the wound should be shown to a doctor at the earliest opportunity. With a splinter of wood, the commonest of such foreign bodies: Pull the splinter from the wound with a pair of pinchers or by putting a knife blade against it and holding it on the blade with the thumb-nail. The same method may be used with a splinter under the nail. But if it is broken under the nail, scrape the nail thin over it and cut out a small V-shaped piece so as to reach it. Small splinters in the skin may be removed by a needle. In order to avoid possible infection it will be much safer to wash the skin with hot water and soap and to pass the needle through a flame before using it. A better way is to paint the skin with iodine and to sterilize with iodine the point of the needle or knife used. A wound from which a foreign body has been removed should never be sealed with plaster or collodion.

WOUNDS OF AND FOREIGN BODIES IN THE EYE,
EAR, NOSE AND THROAT

Eye

As previously stated, the eye-ball is fairly well protected from injury, but such injuries do occasionally occur. The symptoms

are severe pain and redness of the eye, and if a wound has been inflicted it is usually easy to see the cut. Such injuries should be treated by a doctor. Therefore, in any injury of the eye-ball, cover both eyes with absorbent cotton or soft cloths soaked in cool water, so as to keep the eye-lids still, and bandage them into place with bandages around the head. Be careful not to put on these bandages so tightly that they will press on the eye-balls, and in order to prevent inflammation keep them constantly wet with cool water until the services of a doctor can be procured.

Splinters in the eye should be pulled out if possible. If they cannot be removed, put a few drops of olive or castor oil in the eye. Whether removed or not, the eyes should be treated in the manner just described and a doctor should be consulted as soon as possible.

Foreign bodies in the eye are usually cinders, sand or particles of dust. They cause a great deal of discomfort and pain, and tears, which, fortunately, often wash them out.

Never rub the eye, as this will be likely to rub the foreign body into its delicate covering.

First, close the eye so that the tears will accumulate and the foreign body will frequently be washed out or into view, so that it may be easily removed. If this fails, pull the upper lid over the lower two or three times, close the nostril on the opposite side with the finger and have the patient blow his nose hard.

If the foreign body still remains in the eye, examine first under the lower, then under the upper lid. For the former, have the patient look up, press the lower lid down and if the foreign body is seen brush it off with the corner of a clean handkerchief. The upper lid is not so easy to see. Seat patient in a chair with his head bent backward. Stand behind him and place the finger or a pencil across the upper lid one-half inch from its edge. Turn the upper lid up and back and brush off the foreign body as before. A few drops of castor oil in the eye after removing a foreign body will soothe it.

Above all things do not be rough, however, or you may do very serious injury. If you experience any difficulty in remov-



1. Method of inverting eyelid to find foreign body.

ing a foreign body from the eye it is much safer to bandage a pad wet with water on it and to take the patient to a doctor.

Lime in the eye may be neutralized by bathing it with a solution of vinegar, a teaspoonful to a cupful of water. Particles of lime large enough to be seen should be removed like other foreign bodies.

Ear

The treatment of injuries of the ear should be left to a doctor. It should be remembered, however, that injuries of a serious character may be caused by attempts to clean the ear with pointed instruments, and in removing wax from the ear nothing should be used except the end of the finger over which should be placed a handkerchief or towel wet with warm water. Even in using the finger, care should be taken not to crowd it into the ear but to be gentle.

Insects or flies in the ear cause a great deal of pain and discomfort. A little warm oil dropped into the ear, the head being inclined to the opposite side, will usually kill flies and insects and they will float out.

Do nothing further, but obtain the services of a doctor, which should also be done as promptly as possible for other foreign bodies in the ear.

Nose

It will not be necessary to discuss injuries of the nose here.

Foreign bodies, such as shoe buttons, peas and beans, are frequently put into the nose as well as the ears by children, for whom they are dangerous playthings.

If a foreign body has lodged in the nose, close the opposite nostril with the finger and have patient blow his nose hard, or sneezing may be caused by tickling the nose with a feather. If this does not result in the foreign body being expelled, the patient should be taken to a doctor.

Throat

Both injuries of and foreign bodies in the throat are of special interest, not because of their local effect, but because by blocking the wind-pipe they may cause suffocation.

Injuries of the throat may be disregarded here and only foreign bodies will be discussed.

Such foreign bodies are commonly pieces of meat, coins, buttons or other hard substances, and children are naturally the most frequent sufferers.

Symptoms.—Person gags and coughs. Frequently person attempts to pull out foreign body with the fingers. If he is unsuccessful and the foreign body completely blocks the throat his face will become dark red, his breathing will become labored and he will soon become unconscious. If the foreign body does not completely block the air-passage the symptoms will be of the same character, but not so severe.

Prevention.—Babies and small children should not be allowed to put things which may block their throats into their mouths, as a sudden inspiration will be very likely to draw them into the air-passages.

Treatment.—A doctor should be called, but do not await his arrival. The patient should be turned upside down at once. Put the finger into the back of the throat and try to hook out the foreign body. Do this boldly, for failure may mean the death of the patient. After foreign body has been removed, if breathing has ceased, perform artificial respiration. If a person merely chokes, however, because of a foreign body entering the larynx without alarming symptoms of suffocation, thumping him on the back will often dislodge the foreign body and nothing more need be done.

INFECTED WOUNDS

Any wound which has matter or pus in it is called an infected wound. A wound may be infected at the time it is received or later, but in either case it takes some time after infection for pus to be produced. The pus germs

multiply in the wound, cause inflammation and finally their poisons cause destruction of the body cells and this makes the pus. The symptoms of inflammation in a wound, as already stated, are heat, redness, swelling and pain and more or less loss of use. These come on about four days after infection. In an open wound the inflammation attacks the surface or track of the wound and pus is discharged through the wound opening. Besides these infections in which pus is promptly discharged there are other infections in which the pus is bottled up, so to speak. These will now be described. But before doing so I want to say a few words about the treatment of infected wounds discharging pus. All classes of wounds are often infected by improper handling, so one very important part of the treatment is preventative. That is to say if we handle clean wounds well, in the manner already described, much infection will be prevented. The symptoms of inflammation in a wound are danger signals which must not be disregarded. If they appeared in any wound I had, I would want to consult a doctor at once. The only exception is in very trivial wounds such as the little scrapes on our hands which are so common. For these a surgically clean piece of gauze as a dressing will often be all that is needed, or better if you have it, before putting on this dressing, dissolve the pus with a few drops of peroxide of hydrogen.

Pimples, Boils and Abscesses.—All of these are circumscribed collections of pus somewhere in the body. The pimple is just under the outer layer of the skin, the boil is in the deeper layers of the skin and may involve the subcutaneous tissue. While the boil is really an abscess, we usually think of an abscess as being deeper in the body and more serious.

All are caused by pus germs which have lodged at a particular point setting up inflammation there with the production of matter or pus. With the pimple these pus germs are rubbed in through some little break or crack in the skin. This may also be the case with the boil but with a boil pus germs on the skin are frequently rubbed into a hair sheath or through one of the small skin glands. Abscesses are due to like causes though sometimes

the pus germs causing abscesses are carried from another part of the body as from a pus pocket around a tooth, or from the digestive or respiratory tracts.

Another important cause operates. This is lowered resistance of the body tissue. This is seen in several diseases but may be solely due to improper eating.

Pimples, boils and abscesses usually occur where the skin is particularly liable to irritation. For example, boils are common under the arms where clothing rubs. Uncleanliness predisposes because pus germs are more numerous on an unclean skin and because more irritation is caused by dirty clothing rubbing on dirty skin. Too frequent bathing sometimes causes boils, however, when, as is sometimes the case, it cracks the skin. Of course, boils and abscesses may also be due to a wound becoming infected by pus germs. In this case the germs are introduced on the article which makes the wound or by unclean handling afterwards. An abscess at the bottom of a punctured wound is not uncommon.

You all know what the core of a boil is. It is the central part which separates itself from the boil. It is dead tissue killed by the action of the pus germ poisons and the pressure of the pus in the boil, this cutting off the nutrition of the center of the boil. This is nature's method of cure. The core is forced off by continuing suppuration, the pus escapes, the walls fall together and healing takes place. The same thing occurs in a pimple, though the thin layer of skin which separates can hardly be called core; it is called the head of the pimple. In an abscess there may be no core but softening takes place over the abscess and the pus finally escapes on the surface. Our method of treatment should also be to promote the escape of the pus. When a pimple begins to soften or get ripe squeezing will cause the head to pop off and healing will then usually take place. It can usually be hastened by a few drops of peroxide from time to time as this dissolves the pus and allows the walls of the little cavity to come into closer contact thus promoting more rapid healing. The process of suppuration may be hastened in a boil by hot fomentations such as clothes wrung out in hot water and

applied over the boil. They should be covered with oiled silk or some other material which will retain the heat. For the same purpose a hot water bag outside the oiled silk still further prevents the escape of heat. Poultices are also used; they are not so clean.

A deeper abscess should always be seen by a doctor. Nor should you neglect boils. A doctor by opening them when necessary, may save you weeks of pain and prevent possible absorption with other boils or abscesses. Do not attempt to open them yourself. Very bad infections are sometimes caused by the use of instruments not surgically clean for such purposes. Painting collodion on a small boil will sometimes dissipate it, the collodion by its contraction squeezing out the matter, this small amount being absorbed without harm. Painting iodine on the surface in these conditions is absolutely useless. If you have crops of pimples, boils or abscesses be sure to consult a doctor. They show something is wrong with you which needs the correction of an expert.

A pimple ordinarily requires no dressing. Discharging boils and abscesses are dressed like wounds.

Poisoned Wounds

This name is given to wounds into which a poison other than pus germs is introduced. Special treatment is necessary in order to remove and combat the effects of these poisons on the body. Snake bite, bites of dogs and cats and lockjaw will be discussed here.

1. Snake Bite.—Snake bites are rare injuries in this country, but bites from poisonous snakes are so rapidly fatal if not promptly given proper attention that it is necessary for the student of first aid to know how to treat them. The rattlesnake and the moccasin are most generally to be feared in the United States.

Prevention.—When it is impossible to avoid the localities where poisonous snakes are commonly found, comprises the wearing of high boots or leggings by day and sleeping on a cot

or raised platform at night instead of on the ground. The Mexican plan when sleeping on the ground of surrounding the sleeper with a hair rope or lariat is undoubtedly a good one, as snakes will not cross such a rope.

Symptoms.—Great pain in the wound. Rapid swelling. Much depression and weakness, followed promptly by death in some cases unless proper treatment is given.

Treatment.—Immediately tie a string, handkerchief or bandage between the bitten part and the body if this is practical. This can only be done in the limbs. This cutting off of the return of the blood to the body, of course, prevents absorption of the poison. The wound should then be soaked in hot water if this is obtainable and in any event squeezed, milked, or sucked. This is for the purpose of extracting as much poison as possible. Sucking the wound is not dangerous unless one has cuts or scrapes in the mouth. While, as stated elsewhere, there is danger of infection from sucking an ordinary wound, such danger may be disregarded in a snake bite as it is absolutely essential to extract the snake poison. These procedures should not be delayed for a moment in order to send for a doctor but one should be summoned as soon as possible. The further first-aid treatment consists of burning or cauterizing the wound. For this ammonia and permanganate of potassium are both used. Strong ammonia is required and with both do not be afraid to use freely in strong solution. The patient should also be freely dosed with stimulants. A big dose of aromatic spirits of ammonia should be given at once and should be repeated as often as seems necessary to keep up the strength. Do not be afraid to give too much, for persons bitten by poisonous snakes require a large amount of stimulants. Or any other stimulant may be given in place of aromatic spirits of ammonia if it can be obtained more promptly.

Leave the string or bandage tied above the wound in place as long as you dare. After an hour, however, you must remember your tight bandage is likely to cause mortification as it has cut off the circulation. It must therefore be loosened. Never try to remove it all at once but loosen it a little so that only a small

amount of poison will be carried into the body, then tighten and repeat after a few moments if the patient does not seem to be greatly affected by the poison. In this way you may finally be able to remove the constricting band entirely. But, on the other hand, if the poison which escapes into the body seriously depresses the patient you must keep the bitten part tied off and take chances on mortification.

2. Dog and Cat Bites.—The teeth of a dog, and to a less extent those of a cat, make rather nasty lacerated wounds. These are treated like all other similar wounds unless the biting animal is rabid or is suspected of being rabid. Rabies is, of course, the same as hydrophobia. Cows, horses, wolves, foxes and deer also have hydrophobia.

The first thing to do for such a bite is exactly like that for snake bite: tying off, hot water and squeezing to encourage bleeding, and then burning. Of course a red hot wire may be used for burning the wound as well as strong ammonia or nitric acid. Lunar caustic, though so commonly used, is not of much value.

As soon as the bite has been cauterized, remove the constricting band and dress like any wound. Treat shock.

When possible it is best to have a doctor see such bites at once. But in any event you should never neglect consulting him as early as practical on account of the dangers of hydrophobia, which is a terrible disease that may be easily prevented but is never cured.

3. Lockjaw.—The scientific name for this is tetanus. It is due to a special germ which takes time to develop in the body, so just as with pus germs nothing wrong is noticed immediately after a wound is received. The point to be remembered is, however, that lockjaw can be prevented by proper treatment but that it is almost never cured. Lockjaw develops particularly in ragged torn wounds into which dirt or manure has been ground and sometimes in wounds due to rusty nails. It is much safer to have a doctor see such wounds as soon as possible.

QUESTIONS

1. What is a wound?
2. What is the special danger to be feared in a wound?
3. What are the symptoms of great loss of blood?
4. How would you treat an ordinary wound?
5. Why should one try to make a trivial wound bleed?
6. What dressing would you prefer to use for a wound?
7. Do most wounds bleed to a dangerous extent? Explain.
8. How would you treat bleeding from a varicose vein?
9. Treatment of internal hemorrhage.
10. Difference between bleeding from lungs and stomach.
11. What is the treatment for an abdominal wound?
12. What do you understand by foreign body?
13. How would you treat a wound in which there is a foreign body?
14. How do you treat an eye wound?
15. How would you remove a speck from the eye?
16. What are the dangers in removing foreign bodies from the eye?
17. How to treat foreign body in ear, nose and throat.
18. What are poisoned wounds? What are infected wounds?
19. What would you do for a snake bite?
20. What is hydrophobia and how is it caused?
21. What is lockjaw? How is it prevented?

PRACTICAL EXERCISES

1. Show wound dressings and their methods of applications.
2. Have each member of the class put on such a dressing in such a way that neither the dressing nor the wound is contaminated.
3. Show how iodine is used.
4. Show how to treat a snake bite.
5. Show the way to remove a foreign body from the eye.
6. Show the course of the arteries on the subject and the pressure points.
7. Have each member of the class show how to stop severe bleeding from an artery or a large vein at the same time dressing the wound properly.

CHAPTER VIII

INJURIES DUE TO HEAT AND COLD

BURNS AND SCALDS; SUNSTROKE AND HEAT EXHAUSTION;
FROST BITE AND FREEZING

BURNS AND SCALDS

Description.—Burns result from exposure of the body to dry heat, such as a fire, while scalds are produced by moist heat in the form of hot water, steam, etc. With either, the injury may be confined to the skin alone or it may extend deeper. With burns all the tissues of the body may be charred down to the bone and with scalds all the tissues may be actually cooked. With either, the danger, which first of all is shock, will depend upon the depth, extent and part injured as well as on the age of the injured person. In children and old people, burns and scalds are particularly dangerous. Both burns and scalds of the throat and windpipe often cause death, as the swelling of the injured part is likely to result in suffocation.

Cause.—Burns: Flames or fires, hot or molten metal, explosions of gas or gunpowder, the electric currents and strong acids or alkalies.

Scalds: Steam, boiling water or hot oil.

Prevention.—The prevention of burns and scalds is rather a complicated subject, as it involves: (1) Prevention of fires. (2) Putting out fires. (3) Rescue of persons at fires. (4) Extinguishing burning clothing. (5) Preventing burns and scalds from hot stoves, cooking utensils, etc. (6) Avoidance of electric shock. (7) Methods to prevent explosions of gas and gunpowder.

Prevention of Fires

Many fires result from carelessness. Never throw away a lighted match, for it may fall on some inflammable material and thus start a fire. Never allow children to play with matches. Reading in bed by the light of a candle or lamp is likely to result in setting the bed clothing on fire if the reader goes to sleep. Lighted lamps or candles should never be placed under shelves. Clothing hung before a fire should be watched, for as soon as it is dry it may ignite. The clothing of women and children is very apt to catch fire if they lean over an open fireplace. Hot ashes put in wooden boxes or barrels are responsible for many fires. Defective wiring results in the loss of many houses.

Putting out Fires

In cities, of course, this is generally left to a paid fire department, but if one preserves his coolness and presence of mind when he discovers a fire, the fire department may find nothing to do when it arrives. Naturally, it should always be called promptly as soon as a fire is discovered. Immediately one finds a house is on fire he should go to the burning room and try to smother the fire. At first this may be accomplished by a few buckets of water or by throwing blankets or woolen clothing upon it. Sand, ashes or dirt will all quickly smother a fire. One of these should always be used instead of water on burning oil as water will spread the oil and the fire. Burning curtains or hangings should be pulled down before attempting to smother the fire in them. On the arrival of the fire department, usually the best assistance that one can give will be to keep out of the way of the firemen so as not to interfere with them in their work. If no fire department is available, however, it will be best to organize a bucket brigade which should consist of two lines of men from the nearest water supply to the fire. The men in one line pass buckets, pitchers or anything else that will hold water from one to another till the last man throws the water on the fire. He returns the buckets to the water supply by the other line.

Rescue of Persons at Fires

If a building is discovered to be on fire, send for the fire department at once. Until it arrives be sure to keep the doors closed so as to prevent drafts. If the inmates are asleep, hammer and pound on the doors to arouse them. If it proves necessary to search the burning building, enter by a door if possible and leave a responsible person to guard it so it will not be thrown open and cause a draft. Go up to the top floor and work down, examining each room as carefully as possible. If necessary to get air while making the search, it will be best to close the door of a room, then to open a window and to stick the head out till a few good breaths can be obtained. Afterwards close the window to prevent a draft. While searching through a burning house it will be best to tie a wet handkerchief or cloth over the nose and mouth. Remember that the air within six inches of the floor is free from smoke, so when unable to breathe crawl along the floor with the head low, dragging anyone you have rescued behind you. Crawl backward in the same way down the staircases. Do not jump from a window unless you are compelled to and if anyone else is compelled to jump from a burning building and you are outside, put bedding and other soft substances in a pile to break the jumper's fall, or get a strong carpet or rug to catch him and have it firmly held by as many men as can secure handholds. Fire escapes will often prevent jumping, which is always dangerous, and the residents of a high building should always know how to make use of the fire escapes.

Extinguishing Burning Clothing

If your own clothing catches on fire when you are alone, do not run for help as this will fan the flames and make them burn fiercer. Lie down on the floor and roll up as tightly as possible in a rug, shawl, overcoat, blanket or other woolen cloth, leaving only the head out. In a bedroom one should roll up tightly in the bed clothes. If nothing can be obtained in which to wrap up, lie down and roll over slowly, at the same time beat out the fire with the hands. If another person's clothing catches fire,

throw him to the ground and smother the fire with a coat, blanket, rug or the like.

Preventing Burns and Scalds from Hot Stoves, Cooking Utensils, etc.

Slight burns and scalds are, of course, not infrequent in cooks and other persons who work constantly near hot stoves. Their prevention is equally, of course, a matter of more care and attention. It is always very dangerous to allow children to play near hot stoves and as results of this practice many deaths occur annually and many children are disfigured for life.

Avoidance of Electric Shock

Some general rules on this subject are given under the heading "Electric Shock."

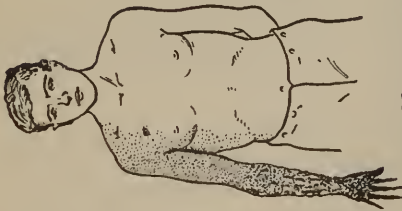
Methods to Prevent Explosions of Gas and Gunpowder

The mixture of illuminating gas and air in certain proportions is a very explosive one. Leaky gas fixtures demand immediate attention. In case a room is entered which is filled with gas which has escaped, the door should be thrown widely open and a rush should be made to open the windows, holding the breath meanwhile, if possible. You should then leave the room and close the door till by opening it you find that the smell of gas has fairly well disappeared, when it may be entered in safety with a light.

In handling gunpowder it will be best to have no matches in the pockets and lighted cigars, cigarettes, pipes and lights of every description are, of course, extremely dangerous.

Symptoms of Burns and Scalds.—Severe burning pain. Depending on depth of injury: Reddening of skin; formation of blisters, or destruction of the skin and some of the tissues beneath it. Shock, severe except in slight injuries.

Treatment.—When the skin is simply reddened: Exclude air by a thin paste made with water and bicarbonate of soda (baking,



1. Showing Different Degrees
from Charring to Reddening
of Skin



2. Dressing for Burn of Forearm

not washing soda), starch or flour. Ordinary vaselin or carbolized vaselin, olive or castor oil, and fresh lard or cream are all good. One of the substances mentioned should be smeared over the burned part and on a cloth used to cover it. A light bandage should be put on to hold this dressing in place. The services of a doctor will hardly be required for such injuries.

When blisters have formed: Treatment may be the same, but if the blistering is very extensive it will be best to show this injury to a doctor.

Destruction of the skin and some of the tissues beneath it: Deep burns require prompt attention from a physician. Pending his arrival they may be treated by the application of the dressing which has been described or like an open wound. A specially valuable dressing material for such burns, or in fact for all burns, is picric acid gauze which is wet, in steam if possible, and is then applied in the form of a compress which should be bandaged in place like any other compress. Picric acid may increase burning slightly at first but will lessen it later. Be careful not to get it on the clothes as it will not wash out. In burns from wax or gutta serena do not try to scrape off.

A solution of Epsom salts is another good dressing for burns. It is soothing. Ambrine is a remedy for burns which has been brought out by the war, during which frightful injuries of this character have been produced by liquid flame, boiling oil and boiling tar. Ambrine itself is a patented preparation but it has not been found difficult to make practically identical substances. They all consist essentially of paraffin and resin of such consistence that they remain liquid while hot and solidify on cooling. The method of application is by a spray apparatus or a brush. While it is well to know something of Ambrine, it has not yet been successfully adapted for the use of the first aider.

Always remember and treat shock.

Besides the burns which have been described, burns are frequently caused by strong acid and alkalies.

These injuries are sometimes due to mistaking one bottle for another. As stated under the head of Poisons, all bottles should

be carefully and correctly labeled and unlabeled bottles should be thrown away. It seems almost superfluous to call attention to the necessity of keeping children away from strong acids and alkalies.

The symptoms of burns by acids and alkalies are the same as of burns caused by heat.

Treatment.—With either, wash off as quickly as possible; best under a water tap.

Acids: While washing injury, have lime-water procured or make a mixture of baking soda and water or get soap-suds and apply freely. If acid has entered the eye, wash it as quickly as possible with water and then with lime-water.

Alkalies: Wash in same way as with acid burns. Neutralize with vinegar, lemon juice or hard cider. Lime burns of the eye should be washed out with a weak solution of vinegar and water or with olive oil.

With both acid and alkali burns, after neutralizing, treat like other burns. In severe burns of this character always see a doctor, and when either acid or alkali has entered the eye secure the services of a doctor as soon as possible. Treat shock.

Warning.—In all burns, whatever the cause, use care in removing the clothing. When the clothing sticks to a burn, do not drag it off, cut around the part that sticks and soak it off later with oil. Never put cotton on a burn as it will stick just as the clothing does.

SUNSTROKE AND HEAT EXHAUSTION

Sunstroke

This is a condition produced by excessive heat. It is a very dangerous one.

Cause.—Sometimes due to direct exposure to the rays of the hot summer sun, especially when the air is moist. Commonly due, however, to somewhat prolonged exposure to excessive heat while working indoors, especially if overfatigued.

Too heavy clothing is likely to help to cause sunstroke, and hats and caps which do not protect the head from the sun are dangerous.

Drinking any kind of alcoholic liquid before physical exertion with exposure to the summer sun is very apt to result in sunstroke.

Prevention.—Avoidance of exposure to sun in middle of the day in summer. The best possible ventilation in workrooms in summer, and avoidance of overfatigue as far as possible. Light clothing for summer and light head-gear with space above head for ventilation. Avoid alcohol.

If one feels the heat he can often prevent actual sunstroke by stopping work, finding a cool place, lying down, bathing face, hands and chest in cold water and drinking freely of cold water.

Symptoms.—Usually before actual attack, pain in the head and feeling of oppression. Insensibility complete, usually. Develops very rapidly. Face red. Pupils dilated. Skin burning hot and dry. No perspiration. Breathing labored and sighing or feeble and gasping. Pulse rapid and full. Often spasms of muscles. Should not be difficult to determine from surroundings, sudden onset and extremely high temperature.

Treatment.—Consists in reducing temperature. Send for doctor. Remove at once to cool place. Loosen and remove as much clothing as possible.

Apply cold to head and body. To do this, cold water or ice should be rubbed over face, neck, chest and in arm-pits. Is still better to put patient in a very cold bath or to wrap him in sheets wrung out in cold water which should be kept wet and cold with water or ice. If this is done, must rub body continually to prevent shock and to bring hot blood to surface.

When consciousness returns, may be allowed to drink cold water freely.

Cold may be discontinued when consciousness returns, but if skin again becomes very hot, must renew. No stimulants.

Heat Exhaustion

Though this condition is caused and prevented in the same ways as sunstroke, it is really quite different from it. Heat exhaustion is just what its name states—exhaustion or collapse due to excessive heat.

Symptoms.—Often begins with dizziness, often nausea and vomiting. Great depression and weakness but not really unconscious so that cannot be aroused. Face pale and covered with clammy sweat but sometimes flushed and hot but never with the great heat that characterizes sunstroke. Breathing shallow. Pulse weak and rapid.

Treatment.—Send for doctor. Remove to cool place and have patient lie down in most comfortable position with clothing loosened. Cold externally, and may sip cold water. Stimulants, as tea, coffee, or aromatic spirits of ammonia.

FROST-BITE AND FREEZING

Frost-bite

This is due to the local effect of cold on the body, parts of which freeze much as do many other objects. The parts of the body which are most liable to frost-bite are the nose, ears, toes and fingers.

Cause.—Cold; insufficient clothing; general weakness with poor circulation of blood.

Prevention.—Protection of the body, especially the exposed parts named above with sufficient covering when it is necessary to expose yourself to intense cold.

Rubbing of any part of the body which becomes very cold in order to increase the circulation, and the supply of warm blood to the cold part.

Symptoms.—In intense cold, frost-bite not infrequently occurs without one's knowing it, but usually the ears, fingers, etc., become painfully cold and then one suddenly realizes that they no longer have any feeling. The color of the frozen part is white or grayish-white.

Treatment.—Object: To gradually bring the frozen part to its natural temperature.

Rub with snow or cold water. Then use warm water gradually.

Warning.—The use of heat at once may result in mortification or death of the frozen part.

Freezing

This condition is produced by long exposure to extreme cold.

Cause.—Extreme cold. Effect of which is increased by over-exertion, hunger, alcoholic liquors and insufficient clothing.

Prevention.—If you expect to be exposed to extreme cold, procure warm clothing sufficient in amount to protect you from its effects. Do not attempt a long journey in the cold without food and do not make the journey so long that you are likely to have to stop and perhaps lie down on account of exhaustion. Do not drink alcoholic liquors, for though they give a temporary sense of warmth, you will be more easily overcome by cold.

If caught out without shelter in very cold weather use all your energy to keep moving. Lying down under such circumstances almost always results in freezing.

Symptoms.—Surroundings should be taken into account. Depression is so great that appearance of patient is like that of a dead man.

Treatment.—Object is gradually to restore warmth to the body. Take patient into a cold room, rub limbs toward body with rough cloths wet in cool water; increase temperature of room if possible. This should be done gradually and cloths should be wet in warmer and warmer water. As soon as patient can swallow, give stimulant—coffee or tea in small quantities, frequently repeated with the addition of a little aromatic spirits of ammonia.

Patient should not be placed before an open fire or in a hot bath until circulation has become active in cool room. You will know this by an increased force of the pulse, better breathing and more warmth and color in the skin.

QUESTIONS

1. What is a burn?
2. What is a scald?
3. Why are burns of the throat and windpipe specially dangerous?
4. What are the general principles governing the prevention of fires? Suppose a fire occurs, how would you try to put it out?

5. How would you rescue a person in case of fire?
6. How would you put out burning clothing?
7. What are the symptoms of burns and scalds?
8. Treatment: Very slight burns and scalds; where blisters have formed; very deep.
9. What is the treatment of burns from strong acids and alkalies?
10. What is the difference between sunstroke and heat exhaustion?
Treatment of each?
11. What is frost-bite? What are the symptoms of frost-bite?
12. How would you treat frost-bite?
13. How would you treat freezing?

PRACTICAL EXERCISES

Treatment of all classes of wounds and burns, with methods of checking bleeding by the class.

CHAPTER IX

SUFFOCATION AND ARTIFICIAL RESPIRATION : DROWNING; ELECTRIC SHOCK; GAS POISONING; HANGING

Suffocation is caused in different ways, but whatever the more remote cause, the immediate cause is always interference with the supply of good air to the lungs, and with the escape of bad air from the lungs.

Symptoms of Suffocation.—At first the lips, the face, the tongue and the nails get blue while at the same time the suffocated person gasps and struggles for breath. The eyes are staring and show suffering. Later the struggle for air becomes greater with all the symptoms mentioned intensified. Regular convulsions come on in the fight to get good air. The last stage and, of course, this is often the only one seen, is complete unconsciousness, with stoppage of the breathing or an occasional gasping breath. The lips, face, tongue, nails, and in fact the skin of the whole body is blue.

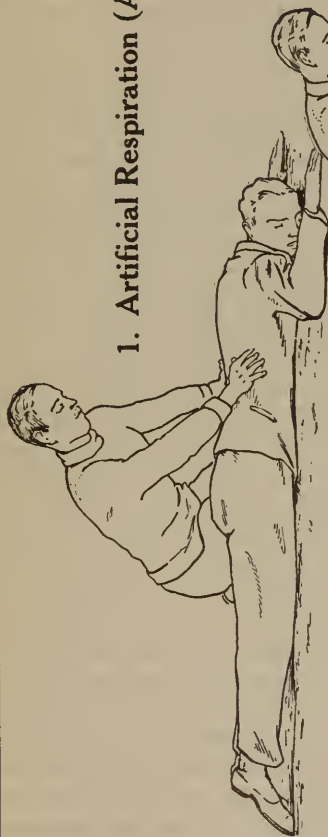
Artificial Respiration

A suffocated person cannot get the good air into his own lungs and the bad air out but fortunately we can do this for him by certain movements imitating breathing. This is called artificial respiration. Before beginning it loosen all clothing so it does not bind the body anywhere. Keep everybody away; a suffocated person needs all the good air he can get.

Artificial respiration consists of alternate movements which diminish the size of the chest, and then by relieving pressure permit it to regain its original size by its own elasticity.

In some forms of artificial respiration the size of the chest is

1. Artificial Respiration (A)



2. Artificial Respiration (B)



also increased by movements which put on the stretch the muscles from the arms to the chest.

The Schaefer or Prone Pressure Method of artificial respiration is now generally used, though the older Sylvester Method is still very popular. The advantages of the Schaefer Method are that it is easy, by it a greater amount of air is got into the lungs, it is not necessary to hold the tongue out and it is much less fatiguing for the operator. Unless the operator is extremely rough no danger attends its practice.

In the Schaefer Method the patient is laid on the ground face down. The arms may be stretched out at full length over his head or one arm may be bent so the forehead rests upon it. In either case the face must be placed slightly to one side so that the ground will not block off the air from nose and mouth.

As soon as the patient is in proper position, the operator kneels at one side, or astride his body but without resting his weight upon it. The palms of his hands are placed on the short ribs across the small of the back with the thumbs nearly together. The operator by letting his weight fall on his wrists by bending his body forward decreases the size of the chest and the air is expelled from the lungs. The pressure is then released by the operator swinging backward, the elastic chest springs out to its original size and the air is drawn into the lungs. The movement is at the rate of 12 to 14 a minute. Better time with a watch.

The Sylvester Method.—Put on the back. The tongue must be held out as otherwise it will fall back and block the windpipe. Grasp it in a dry cloth or pinchers. Have some one hold it out or better hold it out by a bandage or rubber band over the tongue and under the jaw. Put a rolled up coat, a small log or something else of the same shape and size under the suffocated man's shoulders. This will straighten his windpipe. Kneel just above patient's head, catch both his arms just below the elbows. Draw the arms outward and upward gently and steadily and hold them as far as they will go above head for about two seconds. This motion opens and expands the chest to the greatest possible extent. This is due to the fact that certain muscles are attached to both arms and ribs and when the arms are raised

these muscles raise the ribs and so enlarge the chest. Then bring the arms down till the elbows press against the chest; a little pressure will diminish the size of the elastic chest as much as possible. Do this for about two seconds. Continue these motions about fifteen times per minute. This when done properly is hard work for the operator and he should be relieved by some one else as soon as he grows tired.

Whatever the method of artificial respiration used it should be kept up for at least an hour and a half. The United States Life Saving Service continues artificial respiration for four hours if necessary.

It is very important whatever the kind of artificial respiration used to make sure the motions are not made too fast. The chest may be compared to the bulb of an atomizer. Just as with the atomizer you must let the chest fill completely with air.

The further treatment is as follows:

Ammonia, on a sponge or handkerchief put under, but not on, the patient's nose will help to revive him.

At the same time that one or two persons are performing artificial respiration, without interfering with them, others should cover the patient with a dry coat or blankets.

As soon as the patient begins to breathe himself, but not before, his limbs should be well rubbed toward the heart under the blankets. This will help to restore the circulation.

When the patient is partially restored he may have a chill and vomit. If he vomits while on his back he must be turned on his side so that the vomited matter will not enter the windpipe.

He should afterwards be put to bed well covered and surrounded with hot water bottles. The windows should be opened so that he may have plenty of air.

After the danger is over the patient should be allowed to sleep quietly.

He will feel very nervous and shaken for a time and should be given absolute rest till he recovers from this condition. No food except hot beef tea should be given for several hours. Hot coffee, however, is useful as soon as the patient can swallow and retain it.

A doctor is always required for suffocation.

While the pulmotor is now often used to advantage in place of artificial respiration, you must never wait for it.

Warning.—If the breathing stops at any time after it has once begun you must immediately start again with artificial respiration. Piece in rather than do it all. Let the patient breathe himself as he can. You are to make the necessary movements when he cannot. Maintain same rate.

The commoner causes of suffocation will now be discussed.

Drowning

Prevention.—This is discussed on page 164 and the following pages.

Symptoms.—Are of course those of suffocation. In addition a frothy fluid is often noticed in the mouth and nose and the body is cold.

Treatment.—Artificial respiration and other measures just as described under Artificial Respiration. If there is mud or water in the mouth, first clean it out by a handkerchief wrapped around the first finger. If the Schaefer Method is used, you may proceed with artificial respiration at once. If the Sylvester is employed, before giving it, it will be well after cleaning what mud and water you can from the mouth to turn the patient on his face, clasp hands around his waist, raise him by the middle and hold up for a few seconds in order that water may drain from throat and lungs. Don't waste time before beginning artificial respiration.

Electric Shock

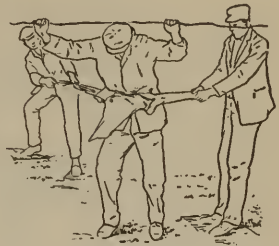
The more general use of electricity is making accidents due to it more common year by year. The third rail and the live wire are responsible for many injuries and deaths.

The ordinary trolley wire carries a current of about 500 volts, and incandescent and arc-light currents run from 2500 to 3000 volts. The passage of these powerful currents through the body causes dangerous shock or even death.

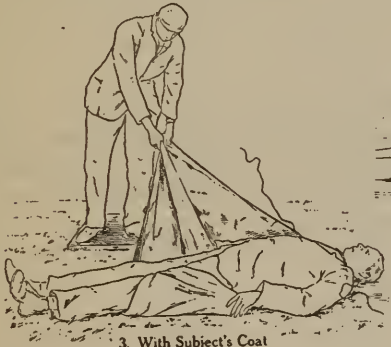
HOW TO RESCUE PERSON FROM CONTACT WITH ELECTRIC CURRENT
 (When possible the rescuers should Stand on Dry Wood or Cloth)



1. With Folded Newspaper



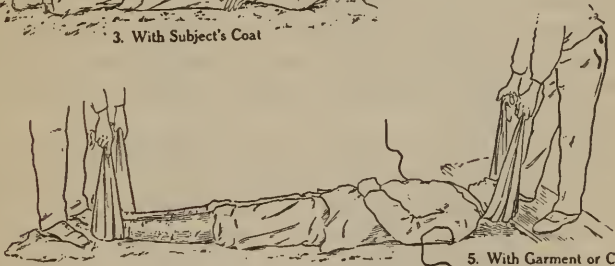
2. With Coat or Sweater



3. With Subject's Coat



4. With Board or Pike Pole



5. With Garment or Cloth

PLATE XXVI.—Rescue methods (electric).

Prevention.—The third rail is always dangerous, so avoid it.

Swinging wires of any kind may somewhere in their course be in contact with live wires, so they should not be touched.

Electric wires must always be carefully avoided.

Symptoms.—Are due to paralysis of the nerve center in the brain which governs breathing and in consequence are those of suffocation.

Sudden loss of consciousness occurs when a powerful electric current passes through the body.

The breathing may be entirely stopped or it may be shallow and only occasional.

Weak pulse as the electric current affects the heart as well as the breathing apparatus.

If hands are in contact with a live wire, may not be able to release them at first.

Burns of hands or other parts of the body in contact.

The direct current causes severe burns but is not so dangerous to life. The alternating while more dangerous to life does not cause as severe burns. Low-voltage currents, especially alternating currents, cause many deaths.

Little difficulty should be experienced in making out cause of injury.

Treatment.—First, rescue; second, treat.

1. Rescue.—In some cases it will be possible to shut off current and this should always be done if it can be done quickly. Otherwise your plan is either to separate current from man or man from current.

A person in contact with wire or rail carrying an electric current will transfer current to rescuer if the latter puts himself in the line of passage of current. Therefore, he must not touch the body of a person touching a live wire or a third rail unless his own body is thoroughly insulated. Naturally too, he must not himself, in attempting to aid the injured person, bring any part of his body in contact with the live wire or other apparatus carrying the electric current. Moreover, he must act very promptly for the danger is much increased the longer the

1. With Wooden Handled Tool.



PLATE XXVII.—Rescue methods (electric).

electric current is permitted to pass through the body. If possible, the rescuer should insulate himself by covering his hands with a rubber coat, rubber sheeting, or even several thicknesses of dry cloth. Silk is a good non-conductor. In addition he should, if possible, complete his insulation by standing on a dry board or a thick piece of dry paper, or even on a dry coat. Rubber gloves and shoes or boots are still safer, but they cannot usually be procured quickly. If a live wire is under a person and the ground is dry it will be perfectly safe to stand upon it and to pull him off the wire with the bare hands. But they should touch only his clothing and this must not be wet.

A live wire lying on a person may with safety be flipped off with a dry board or stick.

In removing the live wire from the person or the person from the wire do this with one motion as rocking him to and fro on the wire will increase shock and burn.

A live wire may be safely cut by an axe or hatchet with a dry wooden handle and the electric current may be short-circuited by dropping a crowbar or poker on the wire. These should be dropped on the side from which the current is coming and not on the further side as the latter will not short-circuit the current before it has passed through the body. Drop the metal bar, do not place it on the wire or you will then be made a part of the short-circuit and receive the current of electricity through your body.

2. How to Treat.—Some cases of electric shock from powerful currents are hopeless from the beginning. It is impossible to tell this at first, however, and, therefore, an attempt should always be made to save the life of patient by prompt treatment. This treatment is artificial respiration.

Burns from electricity should be treated like other burns.

Gas Poisoning

Illuminating gas is so generally employed that this form of suffocation is common. Very similar effects are produced by other poisonous gases.

Causes.—The common gases which produce suffocation are illuminating gas, coal gas from furnaces or stoves and smoke often mixed with different gases. Poisoning from ammonia fumes is seen now much more frequently than formerly, as at present ammonia is so largely used in refrigerating and ice-making machinery.

Prevention.—Naturally is dependent on the cause. Extraordinary care must be taken wherever much gas is mixed with the air.

Leaks in gas pipes should be promptly repaired. Be careful in turning off gas to make sure that gas is actually shut off.

It is dangerous to leave a gas jet burning faintly when you go to sleep, as it may go out if pressure in gas main becomes less, and if pressure is afterward increased, gas may escape into room in large amount.

Coal gas will escape through red-hot cast iron, and very big fires in such stoves are dangerous, especially in sleeping rooms.

Charcoal burned in open vessels in tight rooms is especially dangerous.

In sewers and wells it is customary to lower a lighted candle or torch; if this does not burn it is certain the air is so impure that one cannot live in it.

Symptoms.—Are those of suffocation but in those slightly affected are not so severe; Headache, dizziness, sickness at stomach and vomiting, very sleepy, weak, rapid breathing, fast pulse.

Treatment.—Rescue person overcome promptly and take him where there is plenty of good air. To rescue an unconscious person in a place filled with gas, move quickly and carry him out without breathing yourself. Take a few deep breaths before entering and if possible hold breath while in the place. Frequently less gas will be found near floor. So, one may be able to crawl where it would be dangerous to walk. The treatment is artificial respiration.

In those slightly affected, artificial respiration is unnecessary. Aromatic spirits of ammonia, one-half teaspoonful in half glass of water. Repeat if necessary four times at 15-minute intervals.

Smelling salts to nose. Baking soda, a teaspoonful in one-half a glass of water will settle the stomach and cause belching of gas. In gas works, effervescing phosphate of soda is often provided and is perhaps the best remedy instead of baking soda though if it is not at hand it would be a bad mistake to wait to procure it instead of using baking soda. The dose of phosphate of soda is two teaspoonfuls in one-half glass of water. In gas works too, weiss beer or plain soda water is sometimes used instead of phosphate of soda. The value of breathing in vinegar from a sponge and of the current of air from an electric fan is also generally recognized.

If a person with gas poisoning is fairly strong he should be walked around, two persons supporting him with his arms around their necks. If feet drag this shows he is too weak for this treatment and he should be placed lying down. Then if he is not breathing well, start artificial respiration.

Even in mild cases it is much safer to send for a doctor.

Hanging

Hanging is a common means of suicide. As the rope cuts off the air to and from the lungs the result is, of course, suffocation.

Treatment.—Cut down and remove the rope from the neck. Artificial respiration.

QUESTIONS

1. What is the cause of suffocation?
2. Symptoms of suffocation.
3. What is Artificial Respiration?
4. What would you do for a suffocated person besides performing the movements of artificial respiration?
5. Drowning. Treatment?
6. How weak a current will cause dangerous electric shock?
7. Electric shock; prevention; symptoms?
8. What would you do to rescue a person in contact with a live wire?
9. How would you treat him after he had been rescued?

10. How would you treat a burn due to electricity?
11. Gas Poisoning. Prevention? Treatment?
12. What would you do for a person who had attempted suicide by hanging?

PRACTICAL EXERCISES

Each member of the class should be required to give artificial respiration by the Schaefer and Sylvester Methods.

CHAPTER X

UNCONSCIOUSNESS OR INSENSIBILITY. POISONING

UNCONSCIOUSNESS

Unconsciousness is lack of consciousness. One who is unconscious knows nothing of his surroundings, or of what is happening. There are, however, different degrees in this condition. That is to say, the same causes when not exerted to so great an extent may only cause partial unconsciousness, which may be recovered from without going further, or may be followed by total unconsciousness. Insensibility and unconsciousness are two different names for the same thing. Perhaps no condition which the first-aid student may be called upon to treat may prove more puzzling than this. Unconsciousness may result from a number of different causes, and in order to give the best treatment one should determine first what the cause is. Always make an earnest effort to do this by taking the surroundings into account as well as by examination of the patient.

Suppose, however, that you are unable to determine the cause of unconsciousness. At least make very sure that it is due neither to a poison, to bleeding nor to sunstroke, for each of these demands immediate special treatment, or to suffocation for which you would, of course, give artificial respiration. Then, unless it is necessary to give the special treatment, if the patient is pale and weak have him lie down with his head low and warm and stimulate him in every possible way; on the contrary, if the face is red and pulse is very strong, while the position for the patient should also be lying down, the head should be raised. No stimulants should be given in the latter condition and cold water should be sprinkled on face and chest.

It has been well said there are 2 types of unconsciousness—the white and the red.

A doctor is always needed.

The common causes of unconsciousness are: Bleeding, shock, electric shock, sunstroke, heat exhaustion, freezing, fainting, fits, apoplexy and injury to the brain, and certain poisons.

The six causes which head this list have already been discussed at length and are only mentioned here so that the first-aid student may find in one place all the commonest causes of unconsciousness. Likewise and for the same practical reason, poisoning by alcohol, opium and its preparations, and carbolic acid are discussed here.

1. Bleeding.—Ordinarily you will see the blood in a wound. Even in internal bleeding from the lungs or stomach, blood is often coughed up or vomited as the case may be.

2. Shock.—You learn an injury has been received, or there is other evidence of injury.

3. Electric Shock.—Should be no difficulty in finding out the cause.

4 and 5. Sunstroke and Heat Exhaustion.—In very hot weather. In sunstroke the patient is so hot that his skin seems to be burning. With heat exhaustion, the skin is usually cold and clammy like in a faint which it resembles closely.

6. Freezing.—Should experience no difficulty.

7. Fainting.

Cause.—A lack of blood to the brain. Some persons often faint. Fainting is common in any form of weakness, as when recovering from a severe illness. Some people faint at the sight of blood.

Prevention.—A person who has not yet recovered his full strength after an illness or injury should be careful not to overdo physically. Persons who faint from trivial causes require the advice and treatment of a physician. Remember that fainting may be due to a hemorrhage, and if there is any reason to suspect that the patient is bleeding, examine him carefully and check the bleeding promptly.

Symptoms.—Usually occurs in overheated, crowded places. Patient becomes paler and paler and finally sinks to the floor unconscious. Unconsciousness is partial or complete. Face is

pale, frequently covered with cold perspiration. Pupils are natural. Breathing is shallow and sighing. Pulse is weak and rapid. No other cause for unconsciousness.

Treatment.—Sometimes can prevent fainting by having person who feels faint double over so that head is between knees. If this does not prove effective at once do not continue. Air, especially cold air, and cold water often prevent actual fainting when a person feels faint. If patient has actually fainted, put him in lying-down position with head lower than the rest of his body, so that brain will receive more blood. Loosen clothing, especially around neck, for same purpose. Open windows, if necessary, and keep away crowd so that patient may get plenty of air. Sprinkle face and chest with cold water. Smelling salts or ammonia to nose. Rub limbs toward body. Do not allow patient to get up until fully recovered. May give stimulant when patient has so far recovered that he is able to swallow.

8. Fits.—These, which usually occur in young adults, begin generally by the afflicted person falling to the ground, perhaps with a cry, and then going through all sorts of convulsive movements, throwing the arms and legs about, jerking the head, rolling the eyes, and foaming at the mouth, and perhaps biting the tongue. There should be little difficulty in telling what is the matter at this stage, but afterward, unconsciousness comes on.

If you see or can find out about the convulsion you will at once know what the trouble is. In the unconscious stage this is not so easy. Disarranged clothing, foam at the mouth, and the bitten tongue should be looked for.

In the unconscious stage, it is only necessary to allow the patient to rest quietly. Do not try to prevent the convulsions by holding him. Put him on the ground, or floor, or somewhere else where he cannot injure himself by threshing about and put a piece of wood covered with a handkerchief in his mouth so that he cannot bite his tongue.

9. Apoplexy and Injury to the Brain.—Apoplexy is due to the bursting of a diseased blood-vessel in the brain. The escaping blood presses on the nerve-centers and this causes the

symptoms. An injury of the brain also injures these centers. so from a first-aid standpoint the symptoms and treatment of apoplexy and brain injuries may be considered together.

Symptoms.—Apoplexy often comes on suddenly. In brain injury, may see and learn of injury to head. In brain injury there may be hemorrhages from nose, ears, mouth and eyes. Unconsciousness, complete. Face: Red in apoplexy; pale in injury. Pupils, large and frequently unequal in size. Eye-balls insensitive to touch. Breathing, snoring. Pulse: Full and unusually slow. Paralysis usually on one side of body. Test by raising arm or leg. If paralyzed, will drop absolutely helpless.

Treatment.—Send for doctor at once. Rest and quiet, in a dark room if possible. In lying-down position with head and shoulders raised on a pillow. Ice or cold cloths to head. Hot bottles to limbs. No stimulants.

10. Alcoholic Poisoning.—Alcoholic poisoning or intoxication represents the final stage in acute drunkenness; that is, the common spree.

Symptoms.—Perhaps evidence of intoxication. Unconsciousness, partial or complete; frequently able to arouse patient to some extent. Face sometimes flushed and bloated, or may be pale. Skin cool and may be moist. Pupils natural or large. Eye-balls red, but not insensitive to touch. Breathing about as usual when in deep sleep. Pulse, usually rapid and weak, but may be slow. May be strong odor of liquor. No paralysis.

Warning.—Insensibility from alcohol and apoplexy are more often mistaken one for the other than are any other forms of unconsciousness. The most important symptoms in which they differ are the state of the pupils, the sensitiveness of the eye-balls and paralysis. The odor of liquor on the breath is of little value, because a person with apoplexy may have been drinking.

Treatment.—If any doubt whether drunkenness or apoplexy, always treat for apoplexy and be particularly careful not to make patient vomit, as this will cause more bleeding into brain.

In drunkenness, if able to arouse sufficiently, give emetic—mustard and water or luke-warm water are usually easily procured. Afterward strong coffee or aromatic spirits of ammonia.

Hot bottles around patient. Rub limbs toward body to increase circulation.

11. Poisoning by Opium or some Preparation of Opium, usually Morphine or Laudanum.

Cause.—These poisons are often taken in attempts at suicide but a good many soothing syrups and quieting mixtures contain opium or one of its numerous preparations and as children are very susceptible to these drugs cases of poisoning due to them are not uncommon.

Prevention.—As with all poisons, no opium mixture should be allowed to fall into the hands of anyone who will not know what it is and its dangers. Soothing syrups should never be given to children. All drugs containing opium are dangerous unless prescribed by a doctor.

Symptoms.—May find person has taken opium or may find bottle which contained poison. Unconsciousness which comes on gradually and finally becomes complete. Face red at first, finally dark purple. Lips bluish. Pupils very small, like pin heads. Breathing full and slow at first, gradually slower and shallow. Pulse, slow and full, afterwards weak. Possibly smell of laudanum on breath. Symptoms that should be especially noted are pin-head pupils, breathing and that patient is first very sleepy and then becomes unconscious.

Treatment.—Give an emetic; mustard and water; salt and water; luke-warm water alone in large quantities. Exact dose unimportant, give in large quantities and repeat if profuse vomiting does not occur. (May have difficulty in getting emetic to work.) Plenty of strong coffee. Try to arouse patient by speaking loudly and threatening him, also slap with wet towel. Walk up and down, two persons supporting him. Must stop this if patient is weak or you will exhaust him. Then put on back. Artificial respiration will then be required more than anything else. Stimulants.

12. Carbolic-acid Poisoning.

Cause.—This poison is easily obtained and is often used in attempts at suicide. On account of its strong odor it is rarely taken accidentally. Lysol and creolin have the same effects.

Prevention.—Like that of other poisons. As it produces bad burns it should never be applied to the skin.

Symptoms.—You may find poison has been taken or the bottle which contained poison. Vomiting and great pain. Skin covered with cold sweat. If severe case, unconsciousness, usually followed promptly by death. Strong carbolic acid is a very rapid poison. May almost always know by the strong smell of carbolic acid. Lips, tongue and mouth are burned white by pure, and black by impure carbolic acid.

Treatment.—Epsom and Glauber's salts are fair antidotes. Give a couple of tablespoonfuls of either in a little water. The exact quantity is not important except you must be sure to give enough. Though not so good, lime-water may be used to rinse mouth, several glasses of it being also swallowed. Three or four raw eggs may be given, or castor or sweet oil. Stimulants always, and keep warm.

In burns of the skin from carbolic acid, use alcohol to neutralize the acid. Afterward treat like other burns.

POISONING

Alcohol, opium and its preparations, and carbolic acid have already been discussed.

Any substance taken into the body which will cause death is a poison. But only poisons which are swallowed will be considered here.

Prevention.—Accidental poisoning may be prevented to a very great extent by never taking any medicine which is not properly labeled, and by putting poisons, when they must be kept on hand, in a safe place under lock and key.

Symptoms and Evidence of Poisoning.—The symptoms vary with the special poison. But there is certain evidence which indicates, in the majority of cases, that a poison has been taken. Sudden, severe and unexpected illness in any one after eating, drinking or taking medicine may be due to poison.

Possibly the poisoned person has been melancholy and has talked of suicide. Bottles, glasses or the like in which some of the poison remains may be nearby.

Frequently a person who has taken poison intentionally, becomes frightened and is only too glad to tell some one that he has poisoned himself and what poison he has used. In accidental poisoning the patient is, of course, willing to tell all he knows in reference to the poison.

If a number of persons who have eaten the same food become seriously ill after a meal, it is almost certain they are suffering from poison, probably decayed food or the so-called ptomaine poisoning.

Treatment.—Delay is likely to prove fatal in poisoning so whatever is done must be done promptly. Always send for a doctor at once but do not wait for his arrival. An emetic is not the best treatment for every poison. But, nevertheless, it should always be given if you do not know what poison has been taken and the proper antidote.

Running the finger down the throat or drinking a large quantity of warm water will usually cause vomiting.

Good emetics are:

Mustard and water or salt and water, a teaspoonful of either in a glass of luke-warm water. One or two teaspoonfuls of the wine or syrup of ipecac are also good and usually easily procured. Do not waste time in getting the exact dose, however, and repeat if profuse vomiting does not result. Drink luke-warm water between attacks of vomiting.

The following table, giving the antidotes for special poisons may be consulted with benefit if it is at hand. No attempt should ordinarily be made by the first-aid student to learn it by heart.

Poisons are of Three Kinds

(A) **Corrosive poisons** produce instant burning effect on all parts touched by them so there is staining of lips and mouth and burning pain in mouth, throat and stomach; straining and vomiting; also perhaps suffocation and always shock.

(B) **Irritant Poisons.**—Such poisons irritate but do not corrode parts they touch. No staining; metallic taste; burning of mouth and throat and in stomach, straining, vomiting and purging. Shock.

(C) **Nerve Poisons** do not stain. Two classes:

1. Narcotics. Produce deep sleep and insensibility.
2. Convulsants. Produce convulsions, twitching, delirium and suffocation. (Some poisons are both irritant and nerve poisons.)

(A) **Corrosive Poisons**.—Those which stain and for which an emetic is best not given. Strong acids: Sulphuric (oil of vitriol); hydrochloric (spirits of salt); nitric (aqua fortis). Strong alkalies: Caustic soda, potash and lime.

Treatment.—

1. Neutralize poison.
2. Dilute poison and soothe corroded parts.
3. Stimulants.

(1) If acid, to neutralize give alkalies as plaster from ceiling, magnesia, baking soda or even soap. If alkalies, to neutralize give vinegar, lemon or orange juice.

(2) To dilute and soothe for both acids and alkalies give large quantities of oil, any vegetable or animal oil, such as olive, salad, sardine, linseed, castor or cod liver oil; also water, milk, flour and water, or eggs beaten up.

(3) Stimulants: Strong tea and coffee, or ammonia.

(B) **Irritant Poisons**.—Those which do *not* stain and for which an emetic is given. Tartar emetic, blue stone, Paris Green, lead, corrosive sublimate (antiseptic tablets) phosphorus and arsenic (rat poison and other vermin killers); poisonous plants.

Treatment.—

1. Emetic.
2. Dilute poison and soothe parts.
3. Stimulants.

(2) To dilute and soothe: As in corrosive poisons. *But* no oil in phosphorus poisoning.

(3) Stimulants: As above.

(C) **Nerve Poisons**.—Do not stain and require an emetic.

(1) Sleep producers: Opium, morphine, laudanum, paregoric, soothing syrups, powders, chlorodyne. At first very sleepy, later insensibility, pupils of eye very small, breathing deep, slow and snoring, face first flushed then livid, breath may smell of the poison.

Treatment.—

1. Emetic.

2. Keep awake, strong coffee. Slap with wet towel. Walk up and down supporting on each side. Stop this if weak and put in lying-down position.

3. Artificial respiration.

(2) Convulsants. Strychnine, belladonna, prussic acid, etc. Strychnine is far more common. Is found in some vermin killers.

Treatment.—In all these poisons must work very quickly. Emetic. Do not wait for it to be prepared but tickle back of throat with finger and keep it there till vomiting occurs. Artificial respiration if breathing stops.

QUESTIONS

1. What is unconsciousness?
2. To what causes is it most commonly due?
3. Explain how you would make out the cause?
4. If you were unable to do this what would you do?
5. Fainting; cause; prevention; symptoms and treatment?
6. Symptoms and treatment of fits?
7. Alcoholic poisoning, with what is it often confused and what should you do to prevent such a mistake?
8. Treatment of alcoholic poisoning.
9. Apoplexy and injury to the brain, symptoms and treatment.
10. Symptoms and treatment of opium poisoning.
11. Symptoms and treatment of carbolic-acid poisoning.
12. What would make you think a person had been poisoned?
13. What different classes of poisons are there and the treatment of each class?
14. What would you do if you thought a poison had been taken but could not find out what the poison was?

PRACTICAL EXERCISES

A general review which should include practical problems in first aid of general interest and of interest to the special class.

CHAPTER XI

COMMON EMERGENCIES

1. COLDS. 2. CONSTIPATION. 3. DIARRHEA. 4. CRAMP OR COLIC. 5. NAUSEA AND VOMITING. 6. HICCOUGH. 7. HEAD-ACHE. 8. TOOTH-ACHE. 9. EAR-ACHE. 10. STYES. 11. CHILL. 12. NERVOUS ATTACKS. 13. CROUP. 14. CONVULSIONS IN CHILDREN. 15. CHILBLAINS. 16. CORNS. 17. HOME MEDICINES.

Amateur doctoring is an easy habit to get into, so is self dosing. They are both dangerous. The human body is a very intricate machine which needs skilled care. It is only plain, common sense to give your own body such care, and what applies to you should of course apply to your family and friends. This skilled care can only be furnished by one who has, so far as may be, mastered the intricacies of the human machine—the well-educated doctor.

One great danger in this connection is from patent medicines, which have an enormous sale in this country. Many patent medicines are plain frauds without any medicinal value at all. Perhaps, though, these are the safest to take, everything considered, for if they do no good, at least they do no harm, except one taking them is often lulled into a false sense of security, and for this reason does not go to a doctor until his malady is so advanced that it is beyond human aid. Certain patent medicines contain powerful drugs, of value in their place, but only prescribed by doctors with caution and with special reference to the special needs of a particular patient. They occasionally meet the needs of some one who takes them. The chances that they will do so are not less than ten thousand to one. Other patent medicines are just plain booze or dope. Many drug fiends have got their start from such preparations.

When all is said, however, there are a few simple home remedies which are of value, and may be safely used in emergency and in

slight illness. Dependence on them should be only to the extent that a doctor be consulted if improvement is not prompt or if there be any doubt respecting the gravity of the illness. Mark it down that this will save health, money, time, and perhaps life.

1. Colds

In our climate, colds of one kind or another are far more common than any other disease. Nor is a cold always as trivial as it is sometimes thought to be. On the contrary neglected colds are sometimes the beginning of very serious diseases. Tuberculosis and pneumonia begin as colds.

Prevention.—With a severe cold and if one takes cold easily a physician should be consulted, as it is very likely there is something wrong you do not know about and very possibly this may be corrected if taken in time but if allowed to run on may become incurable. You can yourself do a good deal to prevent catching the ordinary cold, however. Colds are due to germs, to too dry air or to getting chilled or sometimes to all combined. The exact cause is not so important, however, so far as prevention is concerned. You should dress according to the season and avoid getting wet; cold baths increase your resistance. Keep out of dusty places and see the rooms you live in do not get too dry. Moreover, it is much better to keep out of crowded places in winter when colds are very prevalent, for in them you are specially liable to catch cold from someone else.

Treatment.—Many of the patent medicines advertised to cure colds contain dangerous drugs. You will not use them if you respect either your health or your pocket book. All they can do for you, you can do for yourself much better, more safely, and cheaper.

Subject to the warning I have already given about calling in a doctor I advise you to treat a cold as follows: To prevent a beginning cold free use of cathartics is of value. Take calomel at night and a big dose of salts in the morning. This will reduce blood pressure and so the congestion caused by the cold.

Also, to break up a cold, at night drink freely of hot lemonade after taking a hot bath. Then wrap up warmly to increase sweating. This also reduces blood pressure and congestion. You must be careful after doing this not to expose yourself for this is likely to reproduce the congestion of the respiratory tract and perhaps result in a more severe cold than before.

If your throat feels sore, gargle it several times during the day with a solution made by putting one quarter of a teaspoonful of salt in half a glass of warm water.

Light eating for 24 to 36 hours also helps a cold a good deal.

To clear your nostrils and throat, you should use an atomizer. You can make your solutions yourself. A good one is a half a teaspoonful of salt and a half a teaspoonful of baking soda in a glass of warm water. This may be used as a gargle and in an atomizer or snuffed up the nose if you have no atomizer. After using the atomizer spray mentioned it is a good thing to use a spray of liquid vaselin as this protects the membranes of the throat and nose. This is especially necessary if one must go out of doors into the cold air. With a cold, however, it is an excellent plan to stay in the house for a day or two. Generally, this pays in the end by a more prompt recovery.

2. Constipation

Constipation may be prevented in most people. Habitual taking of cathartics is a very bad practice. Eventually they make constipation worse and not better. Persons inclined to be constipated can do much to correct this condition by paying special attention to their diet. The food should be bulky with a large amount of vegetables. The best laxative foods are porridge, cornmeal mush, cracked wheat, syrup, honey, molasses, sugar, whey, buttermilk, coffee (for some people), apples, peaches, pears, prunes, cherries, figs, dates, raisins, preserved or stewed fruit, butter, bacon and salad oils. Drinking plenty of water also helps. Many persons, too, suffer from chronic constipation because they are careless and do not establish regular habits. Instead of always taking cathartics one who suffers from chronic

constipation should try to get rid of the cause of this condition. To do this the advice of a doctor is often required.

For acute constipation, six $\frac{1}{10}$ -grain doses of calomel at intervals of 15 minutes, taken at night, and a Seidlitz Powder or a dose of Epsom salts the next morning are excellent remedies.

3. Diarrhea

Cause.—Diarrhea is commonly caused by indigestible food, or food undergoing fermentation with the production of irritating substances. Chilling of the abdomen is also not an uncommon cause in the tropics or in hot weather.

Prevention.—As one of the commonest causes of diarrhea is indigestible food, you should be careful to avoid this; unripe fruit and partially spoiled food are most dangerous. Even in very hot weather the abdomen should be lightly covered, especially at night, and if one is subject to diarrhea, it will often be prevented by the use of an abdominal band.

Treatment.—The object of treatment is to expel the irritating matter from the bowels. This is best accomplished by giving $\frac{1}{10}$ -grain doses of calomel, 15 minutes apart until 6 doses are taken and by following this after 8 or 10 hours by a Seidlitz powder or a dose of Epsom Salts.

After this if the diarrhea continues with considerable cramping pain a teaspoonful of syrup of ginger in $\frac{1}{3}$ of a glass of water should be given after each passage. For painless diarrhea, 20 grains of subnitrate of bismuth, 3 times daily, is a good and safe remedy. For children a dose of castor oil should be given instead of the remedies which have been mentioned.

The diet is also of great importance in diarrhea and nothing should be eaten which will furnish new food for fermentation or will irritate the digestive organs. Milk in small quantities is the best food for both grown-ups and children. Boiling the milk is the wiser plan unless it is certain that it is very fresh and pure.

If the remedies mentioned do not cure the diarrhea, it is much safer to consult a doctor. There are any number of so-called cholera cures on the market, but the majority contain opium in

some form and are therefore dangerous, especially for children. It should not be forgotten that dysentery or walking typhoid may be masquerading under a persistent diarrhoea.

4. Cramp or Colic

As every one knows, abdominal cramp is a severe pain in the abdomen which comes, lets up, and comes again. The cramps may follow one another very rapidly or there may be some time between them.

Cause.—Common cramp is due to a spasm of the intestines caused by indigestible or irritating food, or by cold, especially when overheated in hot weather. More uncommon causes are appendicitis and gall or kidney stones.

Prevention.—Is the same as for diarrhoea when due to like causes. Prevention of cramp due to the other causes which have been mentioned is too complicated a subject for discussion except in medical books.

Symptoms.—Severe cramping pain in the abdomen and shock in severe cases. If shock is severe, it is well to conclude that something more serious than intestinal cramp is present.

Treatment.—A hot bottle placed on the abdomen or rubbing it will often give relief. Soda mint tablets, or even better, hot water with a little spirits of peppermint or syrup of ginger should be taken. Indigestible matter may be got rid of by vomiting or by a cathartic, such as a compound cathartic pill, salts, or a Seidlitz powder. If shock is severe, always send for a doctor.

5. Nausea and Vomiting

These are also usually due to indigestible food but may be caused by dyspepsia or nervousness.

Treatment.—When due to indigestible food, several large drinks of luke warm water will usually cause free vomiting and will wash out the stomach which is very desirable. The further treatment is the same whatever the cause. Patient should lie down in cool place. Hot applications to abdomen,

cloths wrung out in hot water or a mustard plaster. A soda mint tablet or a little baking soda will usually stop both nausea and vomiting and in other cases sucking small lumps of ice will be found efficacious.

6. Hiccough

Is usually due to overeating and indigestion. It is caused by a spasmodic contraction of the diaphragm, the great muscle which separates the chest from the abdomen. This is the reason that holding the breath as long as possible will usually cure it, as the air in the chest forces the diaphragm down so it does not contract. Drinking a large glass of water in small sips, without taking a breath has exactly the same effect. The reason that a scare stops hiccough, sometimes, is because this causes the patient to take a long breath. If none of these methods is successful, vomiting by removing the irritating material from the stomach will almost always cure the hiccough.

7. Headache

Headache is a common affliction. Few people escape an occasional headache. Common as headache is, however, and despite the great amount of attention devoted to curing headaches by physicians for ages its treatment is often by no means a simple matter. This is because headaches are due to so many causes and not rarely it is extremely difficult to find out the cause. Probably headaches due to improper eating and to eyestrain are the commonest types.

Treatment.—Do not resort to any of the popular headache cures that may be bought in drug stores. While they may give you temporary relief they merely still the pain for the time being and do not reach the underlying cause. You will be compelled, therefore, to resort to them again and again, and almost universally they contain dangerous drugs, especially dangerous if they are taken in quantity and if you get in the habit of taking them you will find you have to increase the dose to get any effect.

A cathartic and leaving food alone will cure many headaches,

with in addition lying down in a cool, quiet and dark room. I know no disease for which it will pay you to consult a doctor more than for headache. That is, of course, if the simple remedies I have given do not cure you, or if you have frequent headaches.

8. Tooth-ache

Tooth-ache is due to decay, and to food entering the cavity of a tooth where it decomposes and causes irritation and pain of the sensitive nerves.

Prevention of decay of the teeth consists first and foremost in visiting a dentist at half yearly intervals so he may put your teeth in condition to withstand decay.

You should habitually remove all food from between them, for such food ferments quickly thus producing an acid which corrodes the teeth. The teeth should be brushed night and morning and after each meal if possible. Dental floss should also be used if difficulty is experienced in dislodging particles from between the teeth with a brush.

For the same purpose a mouth wash will be found very useful, especially at night. A good mouth wash is made as follows: Put a lump of thymol in a bottle of cold or warm water, the water must not be hot as thymol melts at a comparatively low temperature. Allow to stand for a few hours; preferably it should be shaken occasionally. As the solution is used the bottle may be filled up with water.

Treatment.—The best way for you to treat an aching tooth is for you to go to a dentist immediately. Tooth-ache often starts at night, however, or under such circumstances that you cannot get to a dentist at once. Therefore you may be compelled to take care of an aching tooth yourself for the time being. If you have a cavity and the cavity can be reached, it should be cleaned out and afterwards something put in it to deaden the nerve. To clean it, twist a very small piece of cotton around a toothpick or fine knitting-needle and put it in the hole in the tooth, twisting it around and around so as to clean out the cavity thoroughly. After this has been done another small piece of

cotton should be dipped in oil of cloves and then gently put into the cavity on the end of the tooth-pick or needle. If the cavity cannot be reached, the aching tooth must be treated by an application to its gum between the latter and the cheek. A small piece of absorbent cotton soaked in spirits of camphor is excellent for this purpose. The burning caused by it is severe, but it will usually cure the tooth-ache. Tooth-plasters may be used in the same way. Of course, these are merely emergency measures, and because they cure the tooth-ache for the time being, this does not mean that it is safe for you to go on without the services of a dentist. You should realize that unless you have proper attention, decay will go on in the tooth, you will have tooth-ache again, and will finally lose the tooth.

9. Ear-ache

This is particularly common in children, and may be due to bad teeth, to disease of the throat, or to trouble in the ear itself.

Treatment.—Ear-ache is likely to prove a serious matter and if not relieved in a few hours may be dangerous. For this reason no ear-ache should be neglected but a doctor should be consulted. Sometimes ear-ache is due to bad teeth. The teeth should always be examined, and if a cavity is found it should be treated in the way already described. If nothing is found the matter with the teeth or treatment of bad teeth fails to relieve the pain in the ear, it will be necessary to try to stop the pain by treating the ear itself. Cloths wrung out in hot water changed as soon as they begin to grow cold, or a hot-water bottle put on the face covering the outside of the ear will often cure ear-ache. Another method is to heat a cloth very hot and to pour a few drops of alcohol on its center and then apply this over the ear so that the alcohol fumes will enter the ear. Alcohol on a hot shovel is even better, but harder to use. Heating sweet oil just hot enough not to burn and then putting a few drops in the ear and introducing a small plug of absorbent cotton should be tried if the other remedies mentioned do not prove effective.

Severe ear-ache always demands the services of a doctor as

it may result in perforation of the ear-drum, and perhaps permanent deafness, which may often be prevented by a physician if treated promptly.

10. Styes

Styes are an inflammation at the edge of the eye-lid, usually of the small glands there. As they commonly indicate ill health or an error of vision, a doctor should be consulted in order that he may give treatment which will prevent styes appearing again. The pain from a styne may be diminished to a considerable extent by wetting a cloth with water as hot as can be borne and putting it on the eye. If matter appears, a doctor should make the small cut necessary to permit it to escape.

11. Chill from Exposure

When one is exposed to the cold, especially to cold rain or snow, or falls into cold water he will often become what is commonly called "chilled through."

Cause.—This condition is due to the fact that the cold contracts the blood-vessels of the skin, driving the blood to the interior of the body. This gives one the sensation of chilliness.

Symptoms.—You are chilly. The lips become blue and the teeth chatter.

Treatment.—Remove the clothing, if possible, and put into a warm bed, covering the patient warmly. Two or three hot bottles will warm the bed well. Rubbing his limbs and body will also bring the blood to the surface and so help to cure the chill. Hot drinks should also be given. Hot tea, hot coffee, hot milk, and hot lemonade, are all good.

12. Nervous Attacks

These are usually a mild form of hysteria. The patient has a fit of shivering and complains of feeling cold and upset. The treatment is exactly the same as that described for a chill from exposure.

13. Croup

This is a children's disease due to a spasm of the muscles of the upper air-passages. Children often have what is called a croupy cough whenever they catch cold. This is a hard ringing cough which is distressing but not particularly alarming except to parents, who fear, perhaps from previous experience, that an attack of true croup is coming on. Lighting the light, talking to the child, reading to him, or telling a favorite story will often result in the attack passing off and in the child becoming drowsy and finally going to sleep.

True croup is much more alarming though not often dangerous. The child has the ringing cough and croupy crow and becomes partially suffocated because sufficient air does not enter the lungs. The face becomes bluish and the child struggles to get its breath.

Diphtheria is sometimes mistaken for croup. Do not take any chances. You know late administration of antitoxin is not nearly as effective as early.

Treatment.—Send for a doctor but do not wait for him to arrive. Such a child should at once be given an emetic. A teaspoonful of syrup of ipecac is best for this purpose followed by a drink of warm water. Then cloths wrung out in as hot water as the child can stand should be put about the throat and on the chest. These should be covered with a piece of dry cloth, or, better, of oiled silk if this can be procured. Change these cloths as soon as they begin to grow cool, but do nothing further till the physician arrives.

14. Convulsions in Children

Cause.—Something which irritates the brain. There are many conditions in children which have this effect especially in nervous children. Indigestion takes first place as a cause.

Symptoms.—Sometimes the convulsions are preceded by other symptoms such as restlessness, irritability and twitching of the muscles in various parts of the body. More commonly, however, the attack comes on suddenly with little warning. Usu-

ally the first thing noticed is paleness of the face, the eyes are fixed and sometimes rolled up. And in a moment or two twitchings begin in the muscles of the eye or face or in the limbs and then all parts of the body participate in the convulsions. In all true convulsions there is loss of consciousness. These convulsions keep up in the most distressing manner from a few moments to half an hour, then gradually get less frequent and finally cease leaving the child in a condition of stupor. Death may occur, though this is rare except in very young infants. It is usually due to suffocation or to exhaustion. There is no difficulty in telling when a child is having a convulsion.

Treatment.—A doctor should be called. Till he comes keep the child as quiet as possible. Remember his nervous system is so disturbed the slightest irritation may bring on convulsions when they are stopping. Cold should be applied to the head by means of an ice cap or cold cloths. Counterirritation is practised on the body so as to bring the blood to the skin. The mustard bath has been used for this from time immemorial. It is better to use the mustard pack, however, as this disturbs the child less. The mustard foot bath may be used at the same time while the child is lying in its crib. They should be continued till the skin is well reddened. The mustard pack is applied to the stripped child lying on a blanket. His body is surrounded by a large towel wrung out in mustard water, made by dissolving one tablespoonful of mustard in a quart of tepid water. The towel is put around the child while dripping and he is then rolled in the blanket. It may be continued for from ten to fifteen minutes. To make the mustard bath put four or five tablespoonfuls of powdered mustard in a gallon of tepid water. To this should be added four or five gallons of plain water. Hot water may be added to make the temperature of the bath 100° to 103°F.

15. Chilblains

This common condition is caused by chilling of some part of the body and is most frequently seen in old people with poor circulation. The most common places for chilblains are the heel, toes, ears, nose and fingers.

In sensitive people, as it is due to cold, it may be prevented by warm clothing and frequent bathing of the part of the body affected in warm water, afterward drying it with soft towels.

Symptoms.—They are the well-known red appearance of the skin, which appears when the part is brought near the heat, especially in winter after being in the cold. There is considerable burning and itching.

Treatment.—Paint every two or three days with tincture of iodine pure or diluted with alcohol. Several coats of collodion at intervals of a few days are also good, as the collodion exerts considerable pressure on the dilated blood-vessels. If these measures fail, it is best to consult a physician, as chilblains are sometimes very difficult to cure.

16. Corns

Corns are of two kinds—hard and soft. The former occur at the sides of the toes and at the sides and bottoms of the feet. Soft corns form between the toes where the natural secretion makes the skin soft and pulpy. Both varieties of corns may be prevented by the most scrupulous cleanliness of the feet and stockings, and by wearing well-fitting shoes which do not rub and so cause irritation of the skin which leads to the formation of a corn.

If a callus begins to form, rub the place gently with vaselin night and morning. Nitrate of silver stick will usually cause corns to disappear. An excellent corn remedy is one part of salicylic acid to three parts of simple cerate. Bathe and soak the foot in hot water for twenty minutes, dry and apply ointment; cover corn with cotton.

Hard corns should never be cut, but should be rubbed down smooth with sandpaper after washing the skin. They should then be covered with a corn plaster or a piece of adhesive plaster. Cutting a corn, if you get below the hard skin of the corn, is likely to prove dangerous, as it often results in blood-poisoning.

Soft corns should be treated by careful washing and drying of the foot, especially between the toes, then dusting in a little tal-

cum powder and keeping the toes separated by a small piece of gauze. A corn which has become inflamed requires treatment from a doctor on account of the danger of blood-poisoning.

17. Home Medicines

While the first aider is supposed to make all possible use of materials which are found at hand anywhere, there are certain articles which cannot be improvised. Especially in the home, perhaps, and even in a city with drug stores nearby it is wise to have a small supply of a few simple remedies and of surgical dressings. This is particularly the case with children in the household, as little people are so likely to hurt themselves and are much more liable to sudden illness than their elders.

Numbers of medicine cabinets are on the markets but in few, unfortunately, have the contents been selected with practical knowledge of the needs and limitations of the first aider. Some contain drugs which should never be prescribed except by a physician. This objection does not apply to the Red Cross Home Cabinet which has only the simple, safe remedies that are recommended in this book. There is no good reason, however, why anyone should not purchase her own supplies and make up her own cabinet. It is believed that all medical supplies should be put in some sort of box as otherwise they will be lost and wasted and what is even more important cannot be found in time of need. Hanging cabinets are more convenient as by opening the door all the contents may be seen at a glance. They are, however, more difficult to make as cross partitions must be put in. It may, therefore, be better in some cases to use a box in which the contents may be placed on the bottom with a view to putting it on a convenient shelf. Either a wooden or tin box may be used, but if a hanging cabinet is to be made a wooden box will be found more suitable on account of the partitions. In any case the box had best be painted inside and out with white enamel paint. It is also better to provide a lock and key.

Do not make your medicine box too small; it is well to leave space for medicines prescribed by a doctor in illness so that they

may be put away in a safe place. This does not mean, however, that medicines which have served their purpose should be kept. The sooner they are got rid of the better.

It is best to select a standard size of bottle. The two-ounce square bottle will generally be found most convenient. The few drugs which will be required in larger quantities may be put in two bottles.

The supplies suggested for the household medicine box are as follows:

Alcohol, 4 ounces.

Aromatic spirits of ammonia, 2 ounces (rubber cork).

Aqua ammonia—hartshorn—2 ounces, labeled “poison very irritating” (rubber cork).

Castor oil, 4 ounces.

Epsom salts, 4 ounces (or half dozen Seidlitz powders).

Lime water, 2 ounces.

Mustard, powdered, 2 ounces.

Syrup of ginger, 2 ounces.

Syrup of ipecac, 2 ounces.

Witch hazel, 4 ounces.

Calomel tablets, one-tenth grain; small bottle (50-100 tablets).

Bismuth subnitrate tablets, 5 grain (100 tablets in bottle).

Carbolized vaselin or petrolatum, 1 tube.

Oil of cloves, 1 dram bottle (labeled “poison”).

Soda mint tablets, 100 tablets in bottle.

Talcum powder, 1 tin.

Antiseptic gauze, 1 small package.

Absorbent cotton, $\frac{1}{2}$ pound.

Roller bandages, gauze, 6, 3 large and 3 small.

First-aid outfits, Red Cross, 2.

Collodion; 1 small bottle with brush.

Tooth plasters, 1 box.

Corn plasters, 1 box.

Glass and spoon, 1 each or medicine glass, 1.

Scissors, 1 pair.

Pins, ordinary and safety.

Iodine, one-half tincture with one-half alcohol, 2 ounces in bottle, or:

Iodine, army tubes each containing one gram iodine and one and one-half grams iodide of potassium, 6; or Red Cross Iodine Containers, 6 (Label, iodine, "Poison.").

Bottle, 2 ounces, 1.

Camel's hair brush, 1.

QUESTIONS

1. What are the dangers of self-medication?
2. What are the dangers of patent medicines?
3. How would you treat a cold?
4. How would you treat diarrhea; constipation?
5. What are the commonest causes of colic?
6. How would you treat colic?
7. Treatment of nausea and vomiting.
8. Treatment of hiccough.
9. How would you treat chill from exposure to cold?
10. How would you know that a child had croup and how would you treat it? Convulsions.
11. How would you treat headache?
12. Treatment of tooth-ache.
13. Treatment of ear-ache.
14. How would you treat a sty?
15. What are chilblains due to and how would you prevent and treat them?
16. Prevention and treatment of corns.

PRACTICAL EXERCISES

General review. As part of this review tell what each article in the medicine box is used for and in what quantities.

CHAPTER XII

INJURIES AND EMERGENCIES OF THE HOME AND OF IN-DOOR AND OUT-DOOR SPORTS

1. HOME. 2. GYMNASIUM. 3. BASEBALL. 4. FOOTBALL.
5. BOATING, SKATING AND SWIMMING. 6. SHOOTING AND
FISHING. 7. AUTOMOBILE. 8. CAMPING AND SUMMER OUTINGS.

I. HOME INJURIES

The treatment of such injuries presents nothing new, but their prevention is a most important matter for, numerically, at least, accidents in the household and about the home premises are more important than those that occur under almost any other condition.

The statement is made by the Travelers Insurance Company, to which indebtedness is acknowledged for much of the material in this section, that nearly twenty-eight per cent. of the total number of claims paid for accidental injuries (not including industrial accidents) by that company during 1917, were for injuries received in and about the household, the number being considerably larger than for any other class of accidents.

In a certain coroner's office, the records for eleven years show that more than fifty per cent. of all fatal accidents were the results of injuries received in the home. Testimony to the same effect might be multiplied, but this is not necessary, for without doing so, it can be set down as a fact—that the home will not prove the place of security which it should, unless common care is exercised to prevent accidents.

Many home accidents are due to falls; and ladders are responsible for many of them. Broken or rickety ladders are always unsafe, and all ladders should be firmly set and one using them should be careful to step on the rungs squarely, so as not to over-

balance. If you use a chair, table, or barrel in place of a ladder, even more care is necessary.

Many serious accidents are due to falls on stairs. Hand railings are necessary, and good light with no loose carpets or carelessly left objects in the way. It is really quite a feat to balance ones' self in going up and down stairs, but we are so accustomed to it that we forget this is the case. It may be brought sharply to our attention by a bad fall, if we run down stairs too rapidly.

Slippery surfaces are also responsible for many bad falls. A rubber mat prevents slipping in a bath-tub. Highly waxed floors are dangerous and so is newly washed oil-cloth or linoleum. The danger of slippery floors, or any floor for the matter of that, is much increased if objects are left to lie on them which can be tripped over. A cake of soap, innocent as it is in its proper place, constitutes a man trap when lying on the floor. Pencils and other round objects on the floor are almost as dangerous. Pails, brooms, loose carpets and rugs trip the unwary, and often the wary, especially in a dark place.

Outside steps and platforms should, in winter, either be promptly cleared of ice, or be sprinkled with sawdust or ashes.

All openings in the yard or anywhere else about the house should have close well-fitting covers on a level with the ground or floor.

We are so accustomed to the performance of our daily household tasks that we never think there is any danger connected with them till we receive an injury. The majority of these accidents occur from the use of sharp tools. A razor, a carving knife or an ice pick can produce as bad a cut as a factory tool, if it is not used carefully. Tools are commonly used in the household, and, unfortunately, we often fail to keep them in as good a state of repair for safety as is done habitually in the factory and work-shop. In the first place, all home tools should be kept in a tool box so that one may not injure himself through encountering them through mischance. Children are in particular danger from sharp tools carelessly left anywhere about the house, but adults also frequently suffer injury from this practice.

A good many nasty cuts result from using pocket knives to pierce holes. An awl and not a knife is the proper instrument for this purpose. In using a pocket knife, don't draw it toward you, push it away from you.

Openers can be obtained for glass jars, tin cans and bottles. Use them and not something else.

SPORTS

As it is now universally admitted that great physical benefit results to those who engage in healthy sports, the possibility of injuries occurring therein should not be given too heavy weight. The man or boy who enters a physical contest will not go far if he has always before his eyes the possibility of accident. In sport, just as in everything else in life, the successful contestant is he who puts all his energy into making the best possible showing and nothing that is said here should be taken to mean that he should not do this. The risks run are but part of the game and should be accepted as such. Remember that foolhardiness is not courage, however.

There is also one other point which is worthy of consideration here. Violent physical exertion should be gradually prepared for and not rushed into without preparation. A man who is soft has not only soft voluntary muscles, but the muscle of his heart is also soft so that it may be easily strained with perhaps permanent injury. Many of the accidents which we read of as occurring to those engaged in sports are due to their poor physical condition. A man or boy in good training has firm muscles which, to a great extent, prevent his internal organs from blows and falls. Soft muscles cannot do this and with them a trivial blow may prove dangerous.

2. GYMNASIUM

Bruises, strains, sprains, dislocations and fractures are the commonest gymnasium accidents. The section devoted to these subjects should therefore be studied in connection with them. Boxing is of course responsible for many bruises, especially black eye, which should be treated by the application of cold water or a cold knife-blade. The so-called "alum curd" made by putting

powdered alum in milk till a curd is formed is also an excellent application. Both cold and alum contract the vessels and so prevent the escape of more blood. Persons said to be knocked out by blows or falls in gymnasiums will in almost all cases be found to be suffering from shock and should be so treated.

3. BASEBALL

Severe injuries of the head are sometimes caused by being struck by balls or bats. Blows in the abdomen are also not uncommon. Both should be treated like any other severe injury of the same general character. The services of a doctor should be secured as soon as possible.

Bruises are common but their treatment is not peculiar.

Injuries of the hands and fingers are the commonest baseball injuries. Dislocated and fractured fingers are treated just as are these injuries from other causes.

The name "split finger" is given to the splitting down of the web between the fingers and also to the splitting of the soft tissues of the fingers themselves. Split of the web between the fingers makes generally a clear-cut wound which often bleeds freely. The best way to treat it is to bring the two fingers together and to bandage them in this position without putting anything in contact with the wound itself. Preferably, before this is done, if you have it, the wound should be painted with iodine. This injury should be shown to a doctor.

Splits of the fingers themselves are best dressed with a piece of gauze and a bandage. A surgically clean bandage may be put directly on such a wound. Severe splits of this character should also be shown to a doctor. Shock is sometimes severe in these injuries and should be treated.

The finger-nails are frequently torn partially off by baseballs. They should be replaced and held in place by a strip of adhesive plaster.

Wounds of the legs and feet, and sometimes of the hands, from the spiked shoes worn by baseball players, are common. So common that it is a serious question if it would not be better to do

away with spikes by rule. These spikes make very nasty wounds. After the clothing or shoes and stockings have been removed the part should be immediately painted with iodine and covered with gauze and a bandage. Like other wounds, touching such wounds with the hands is likely to prove dangerous.

Shock must often be treated.

These injuries demand attention from a physician.

Emergency supplies are now usually kept on hand by professional and college teams. All that are needed are a few narrow gauze bandages wrapped up so they are kept clean, two first-aid packets, a roll of adhesive plaster, iodine, a two-ounce bottle of aromatic spirits of ammonia, a sharp knife, a pair of scissors and a few safety and common pins.

4. FOOTBALL

This, on account of the very severe exertion involved, is the best example of a game which should not be played without careful and gradual preparation.

Bruises, strains, sprains, dislocations and fractures are not particularly uncommon. They are treated exactly like such injuries generally. The knocking out of a football player is usually due either to shock or exhaustion. Men in fine condition recover from slight shock promptly and are again able to take part in the game. Exhaustion always requires rest, and when a man is visibly exhausted it will certainly be better for him, and probably for the eleven, to which he belongs, to take him out of the game.

Of course, at big games doctors are, as they should be, available to treat football injuries.

5. BOATING, SKATING AND SWIMMING

Drowning is the only accident which will be discussed here.

Prevention.—This will be spoken of under two heads: 1. Prevention of accidents that may result in drowning. 2. Rescue of Drowning Persons.

1. Prevention of Accidents that may result in Drowning.—

Boating accidents are frequent in all parts of the country during the summer season. In order to do your part to prevent them—

Remember: A light boat is not intended for heavy seas; do not change seats except in a wide and steady boat, and above all things do not put yourself in the class of idiots who rock the boat. In case you are thrown into deep water by the turning over of a boat, or from any other cause, do not lose your presence of mind even if you cannot swim. Remember that the water will almost support your weight. Allow yourself to sink low so your nose is just above the water and support yourself by a hand on the boat. Even an oar under the chin will hold you up. If there is nothing which will help to support you, lie flat on the back with the arms stretched out. Especially in salt water with light clothing, one may float almost indefinitely in this position. To do so it is necessary to keep cool if the water or spray rises over the face momentarily. Throwing up the head, or still worse the limbs, to prevent this will result in your sinking.

At the seashore, unless you are a strong swimmer, do not go outside the life-lines and if the undertow is strong be careful that you do not walk out so far that you may be carried off your feet.

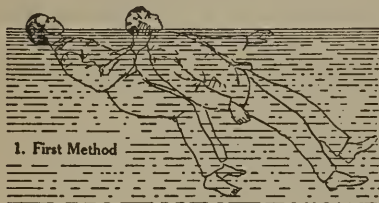
The art of swimming should be made a part of the education of every boy and girl. It is not enough to know how to swim a few strokes. One should at least be able to swim for a few moments while dressed.

Very cold water and very long swims are likely to result in the exhaustion of even a strong swimmer and are therefore hazardous unless a boat accompanies the swimmer.

2. Rescue of Drowning Persons.—If possible, do not attempt to rescue a drowning person in deep water by entering the water yourself. The best interests of the drowning person are served, when this is practicable by holding out or throwing something into the water on which he can support himself till he can be pulled ashore or reached in a boat. In case a person has fallen into deep water near the shore take an oar, a pole or even your

RESCUE METHODS

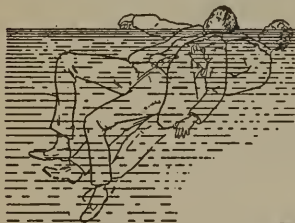
Rescuer should not go into the water unless Necessary but should use a Line, Buoy or Boat



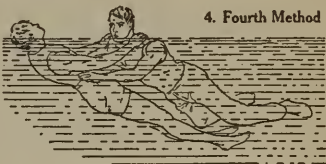
1. First Method



2. Second Method



3. Third Method



4. Fourth Method



5. Fifth Method



6. Ice Rescue

coat and hold it out so the drowning person may grasp it. Life preservers, boxes, boards or logs may also be thrown into the water close to the person drowning. As has been stated above, a small, floating object is quite sufficient to sustain a person's weight in the water.

If the person in danger of drowning is so far from the shore that the methods just spoken of cannot be used you must enter the water to rescue him. Take off as much of your clothing as possible. It is especially necessary to rid yourself of your shoes. If you are not a strong swimmer it will be much better to support yourself with a life preserver, a board, box, or the like when swimming out to the drowning person. Always take care not to permit him to grasp you, for this may result in drowning you both. If he succeeds in seizing you it will be safest to allow yourself to sink or to strike him a blow in the face in order to make him loosen his hold. There is no cruelty in such a blow; it may be his only salvation. Unconscious persons are in fact rescued much more easily.

Always approach a drowning man from behind, grasp his hair or collar with your left hand and his right shoulder with your right hand keeping him at arm's length with his mouth and nose just above the water, then "tread water." As soon as you can, seize his right wrist and pull it behind his head, then take a few strokes to get on your back, at the same time pull the person you are rescuing on your chest and start to swim backward to shore. Swim as low as possible, with your face and that of the drowning person, just out of the water.

Other rescue methods and the different methods of breaking "death grips" are illustrated here.

To rescue a person who has broken through the ice: You should first tie a rope around your body and have the other end tied, or held, on shore. Then secure a long board, or a ladder, crawl out on this or push it out so that the person in the water may reach it. If nothing can be found on which you can support your weight do not attempt to walk out toward the person to be rescued, but lie down flat on your face and crawl out as by doing

BREAKING DEATH GRIPS



1. When Rescuer is Held by Wrists



2. When Rescuer is Clinched around the Neck

RESTORING NEARLY DROWNED

3. When Rescuer is Clutched around
the Body or Arms

1. Artificial Respiration (A)



2. Artificial Respiration (B)

this much less weight bears at any one point on the ice than in walking.

Symptoms.—Are of course those of suffocation. In addition a frothy fluid is often noticed in the mouth and nose and the body is cold.

Treatment.—Is naturally that of suffocation in general—artificial respiration. Also afterward necessary measures to restore warmth to the body.

In order that the proper treatment for drowning may be given promptly, the necessary directions should be posted at all boat-houses and bath-houses.

As soon as the nearly drowned person has been taken from the water loosen all tight clothing, at the same time send some one else for a doctor and for dry clothing and blankets when possible. Quickly clean mud or water from the mouth with a handkerchief on the finger.

Artificial respiration which is the essential treatment for drowning is described on page 124.

At the same time that one or two persons are performing artificial respiration, without interfering with them, others should remove the patient's wet clothing and dry him with towels or something else, then cover him with a dry coat or blanket.

6. SHOOTING AND FISHING

Shooting accidents are common and generally result from carelessness in the use of rifles or shot-guns.

Shooting

Prevention.—Never put a cartridge or shell into the chamber before you need it and always remove it when the need for it ceases.

Do not cock a gun except when you expect to shoot at any moment and uncock it when this necessity ceases. Never point a gun, whether loaded or unloaded, toward yourself or

anyone else. Be particularly careful in going over or through fences, and in boats.

When hunting in company try to know where your companions are at all times and do not fire in that direction. Make sure in firing at anything in the woods that you are not shooting at a man.

Symptoms.—Wounds from rifles have already been described as punctured wounds. Wounds from shot-guns received near the muzzle are lacerated wounds with great destruction of the tissues and often actually tear off parts of the body. At a far distance shot may lodge just under the skin or may only produce a bruise with a stinging sensation.

Treatment.—For the trivial injuries which have just been mentioned the services of a doctor are never immediately necessary, though when shot has lodged under the skin, a doctor should always remove it, as blood-poisoning may follow attempts to do so by other persons.

With serious shot-gun or rifle injuries circumstances are usually such that a doctor cannot be obtained promptly, though one should be secured as soon as possible. A comrade of the injured man will, therefore, almost always be compelled to give necessary treatment. This does not differ in any respect from the treatment of such wounds due to other causes. The bleeding may be very severe, however and must be checked at any cost, even if the wound will probably be infected in doing so. Shock always demands treatment.

Fishing

A fishhook caught in the flesh, if the barb is not engaged, is easily removed. If the barb is firmly fixed, however, quite the contrary is true. In this case the point of the hook should be pushed through till the barb has passed through and out of the skin. The barb should then be cut off with a strong pair of nippers. Such a wound should, when possible, be shown to a doctor, as it is very likely to become inflamed. If this occurs a doctor's services are always required. In any event, the wound should be put in hot water, which, if possible, has been previously

boiled, and squeezed so as to squeeze out poisonous matter. Such a wound should never be sealed with collodion or plaster, but should be dressed with a surgically clean or antiseptic compress or bandage, without, or better with iodine.

7. AUTOMOBILE

Automobile injuries are becoming increasingly common on account of the more general use of the automobile.

Such injuries are usually bruises, strains, sprains, dislocations, fractures or wounds, and are likely to be very severe and of a crushing or mangling character.

Prevention.—Every owner of a car should himself know or have some responsible person in his employ who is able to recognize whether his automobile is in fit condition to run with safety. Automobile accidents due to the most obvious defects in the mechanism of cars are far too common.

High speed, especially at night and on poor roads, is responsible for many accidents. Slippery roads demand especial care on the part of the driver, on account of the danger from skidding.

The use of alcoholic liquors by drivers of automobiles is as dangerous, if not more so, than similar indulgence on the part of locomotive engineers.

Grade crossings of railways should be approached by the automobilist with the greatest care, as accidents due to collisions with railway trains are very common.

The **Symptoms** and **Treatment** of automobile injuries need not be described as they are exactly the same as with similar injuries due to other causes.

8. CAMPING AND SUMMER OUTINGS

A number of not closely related injuries and emergencies will be discussed under this heading. None is peculiar either to life in camp or to summer outings, but they do occur more commonly under such conditions. As out-of-door active life is also not infrequently accompanied by injuries, such as bruises, strains, sprains, dislocations, fractures and wounds, these should also be studied in this condition.

This section comprises: Sunburn, Mosquito bites, Stings and Bites of Insects and Spiders, Poison Ivy or Oak, Plant poisons, especially Mushrooms, Bites of Snakes, Injuries of feet, Cramps in legs.

Sunburn

This may vary from a slight redness of the skin to a very severe burn. Persons with delicate skins may avoid a good deal of needless discomfort and pain by protecting themselves when exposed to the bright summer sun. That there is anything healthy in sunburn or tan is a wholly false idea. The measures of protection are naturally the use of hats and clothing which shade the face and body from the sun. Wetting the face, especially with salt water, is likely to cause very severe sunburn. Any toilet powder will protect the face from the sun's rays to some extent.

The treatment consists of soothing applications; ordinary or carbolized vaseline may be used. An excellent application and one easily prepared is 1 part of lime-water, 3 parts almond or olive oil.

Mosquito Bites

These injuries are usually regarded as of trivial importance, but it is well to remember in malarial districts that malaria is caused by mosquitoes and that to prevent this disease mosquito nets and other means of protection against them should be used.

Ammonia is the best remedy, as the poison is an acid one.

Lime-water with two drops of carbolic acid to the ounce is also good. Menthol and toilet powder often give temporary relief.

Stings and Bites of Insects and Spiders

These are rarely dangerous to life, though they may cause a great deal of pain and discomfort. Nothing need be said in reference to prevention or symptoms. Ammonia should be immediately applied to the part where the sting entered; this should be removed if it remains in the wound. Afterward cool,

wet dressings should be used. Cloths wet with water in which a very few drops of carbolic acid have been thoroughly mixed, and wet salt are good applications.

Poison Ivy or Oak

These plants, which so commonly cause skin poisoning, belong to the sumac family. Two varieties are described—one, a shrub or small tree, with oval, pointed leaves arranged in clusters of from seven to thirteen on a common stalk; the other is a creeper or a climbing plant with broad leaves, sometimes slightly notched, arranged in clusters of three. Both have berries.

These plants cause poisoning in almost every one if touched, and some persons can scarcely go near them without being poisoned. Early in an attack a person may convey the disease from one part of his body to another, and extremely rarely one person infects another.

Prevention.—Is naturally avoiding poison ivy or oak. Remember there is no certainty that if you have handled these plants at one time without injury that the same will be true on another occasion.

Symptoms.—Are those of a severe inflammation of the skin. This, of course, appears more often on the exposed parts, usually the hands and arms and the face. The skin becomes much inflamed and swollen, blisters form and even pus sometimes. There may be loss of the upper layers of the skin and a red, weepy surface. The pain, itching and discomfort are severe. The symptoms, as a whole, are very violent.

Treatment.—If severe, a doctor should be consulted promptly. A very good and simple treatment is a wash of a two or three per cent. boracic acid solution followed by the ordinary zinc ointment. Lime-water for the wash and carbolized vaseline for the ointment are fairly good remedies. The ointment should be washed off daily with the wash, the part dried gently and the ointment reapplied. An old household remedy is made by putting a copper cent in vinegar. Lately, a saturated solution of Epsom salts has been highly recommended.

Plant Poisons, Especially Mushrooms

A number of the common plants are poisonous. Among them are Bitter Sweet, Deadly Night Shade, Mountain Ash, Hemlock, Hellebore, Jamestown Weed, Wild Parsley and Lettuce and certain Mushrooms and Toadstools. Cases of poisoning, except from the last, are rare.

A rule which should always be observed is never to eat anything growing unless you are very sure that you know it is not poisonous and to prevent children from doing so.

Mushroom, sometimes called toadstool poisoning, is commonly due to failure to distinguish between the poisonous and non-poisonous varieties.

The rules which are commonly accepted for doing so are as follows:

Consider dangerous all mushrooms which have:

1. "A cup-like formation at the base of stem (so-called death cup)."
2. "A scaly or close-fitting layer at the base of the stem."
3. "Loose warts on the cap."
4. "A milky juice (unless this is red)."
5. "Great brittleness, with gills nearly all of equal length and the flesh of the cap thin."
6. A honeycombed appearance of the gills, if the flesh tastes bitter, or the mouths of the tubes are reddish, or the flesh changes color when cut or bruised."
7. "A cobwebby veil or ring when the plant is young."
8. "A slimy cap and clay-colored spores" (Dulles).

Moreover, all mushrooms that are decaying or are in the immature button stage should be discarded.

Symptoms of Poisoning from Growing Plants.—Nausea and vomiting. Severe pain in abdomen. Great depression. Unconsciousness, sometimes, weak pulse, shallow respiration. Delirium from some poisons.

Treatment.—Send for doctor. Cause vomiting. Stimulants. Rest in lying-down position, with head low. Cover warmly and apply heat by means of hot bottles around patient.

Snake Bite

This subject is discussed on page 109.

Injuries of the Feet

The pleasures of a camping trip which requires much walking depend to a great extent on the condition of the feet.

The importance of well-fitting shoes cannot be overestimated. The shoes should have heavy soles, moderate heels and be neither tight nor loose though they should be tightly laced and longer than the feet. New and stiff shoes are almost sure to be very uncomfortable; shoes should be worn sufficiently beforehand so that they will have adapted themselves to the shape of the feet. Wool is the best material for the socks or stockings and they must be long enough so that the toes have free play. Great care should be taken to have any darns smooth. The feet should be carefully washed and dried after a day's walk and clean socks or stockings should be put on. If the feet are swollen or hot, wash them with warm salt water or alcohol before putting on fresh hose. Talcum powder will prevent foot troubles. In the morning dry the feet thoroughly, rub on the powder and shake a good amount in each shoe.

Blisters are best treated by washing the foot thoroughly in hot water, then taking a clean needle and pricking the blister, not directly, but through the skin at the side, and gently pressing out the fluid in the blister till it is flat.

To toughen and harden the feet soak them for some time in a bowl of cold tannic acid solution, a tablespoonful of the acid to a bowl of water. A solution of alcohol and salt answers the same purpose.

Cramps in Legs

Cramps in the leg-muscles often come on after unusual exertion. They are best treated by rubbing and kneading the muscles. Wrapping the legs in hot cloths will also assist.

The emergency supplies for a camp should, if possible, be those already given for the household. They may, however, be some-

what cut down in bulk and number in case of necessity. The minimum should be:

Aromatic Spirits of Ammonia, 2 oz. bottle, rubber cork.

Syrup of Ginger, 2 oz.

Seidlitz Powders, 12 in tin box.

5 gr. Bismuth Subnitrate tablets (100).

$\frac{1}{10}$ gr. Calomel tablets (50).

Carbolized Vaseline, 1 tin.

Oil of Cloves, 1 Drachm bottle, labelled "Poison."

Soda Mint tablets, 50.

1 Tin Talcum Powder.

1 Small package Antiseptic Gauze.

2 Red Cross First-aid Dressings.

Iodine, 2 ounce bottle of the tincture made half strength by mixing with an equal quantity of alcohol, or better 6 army tubes or 6 Red Cross Iodine containers.

1 box Tooth wax.

1 box Tooth plaster.

1 Camel's Hair Brush.

1 box Corn plaster.

1 Sharp knife.

1 Pair scissors.

Needles and pins, ordinary and safety.

PRACTICAL EXERCISES

Treatment by the class of injuries described in this chapter of particular interest and importance to its members.

CHAPTER XIII

HOW TO CARRY INJURED

A first aider will usually find when he has treated a wound or injury or has cared for a sick person that his duty is but half performed. Accidents and emergency cases of sickness usually occur in places from which it is absolutely necessary to carry patients, and even in his home the patient must frequently be transferred to his bed. Unless the proper means for carrying patients are understood and practised very grave harm may result to them. In fact, the benefits from good first aid treatment may be undone by bad transportation.

It should be understood, of course, that whatever method of carrying is adopted, first aid should be given before it is attempted, and that when necessary the clothing should be loosened so that it will not constrict the neck, chest or abdomen during transportation.

The kind of transportation which should be furnished must of course vary widely with the character of the complaint. All serious cases of illness or injury should be carried on stretchers whenever it is possible to procure or to improvise them, and in case of doubt it is always much safer when practicable to carry the patient lying down.

The ordinary type of stretcher is so well known that it hardly need be described. It consists of two long poles with a bed, usually made of canvas, between them and cross-pieces to keep the long poles apart and thus to stretch the canvas. The poles are long enough to afford handholds for the bearers at each end of the stretcher. Fairly satisfactory stretchers may be improvised. The easiest one of these to make, usually, is the coat stretcher. For this two coats and a pair of poles are needed. The sleeves of the coats are first turned inside out and the coats are then placed on the ground with their lower edges touching

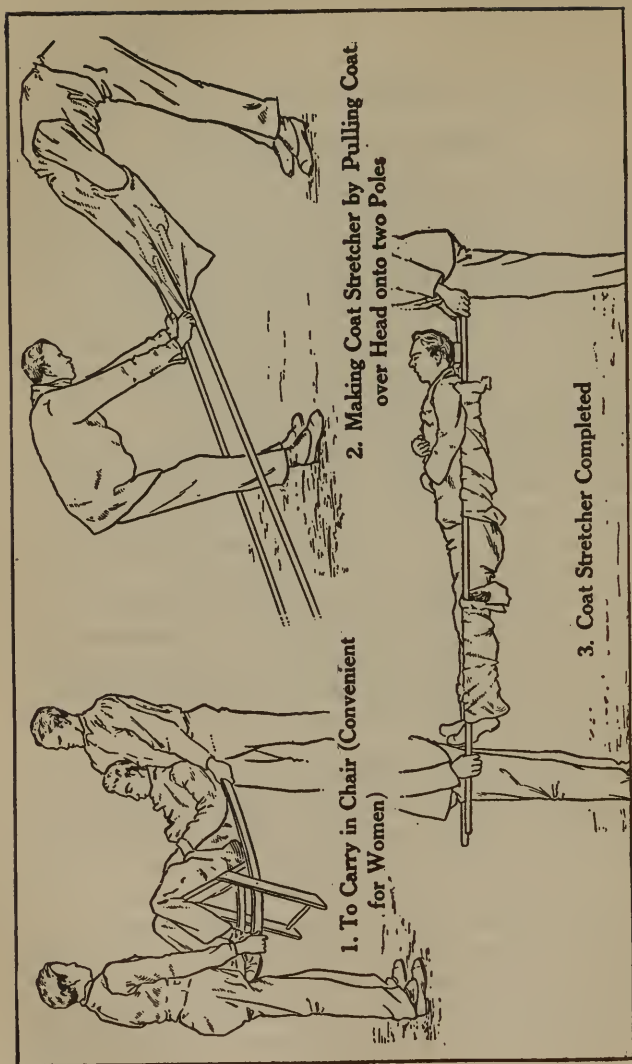


PLATE XXX.—Transportation.

each other, the poles are passed through the sleeves on each side, the coats are buttoned up and the buttoned up side turned down, or the coats may be pulled over the heads of the bearers grasping the stretcher poles. Two poles and a large blanket or rug may also be used to make a litter. The blanket or rug is spread on the ground with the two poles at the edges of its long sides. These edges are then rolled on the poles till a distance of about 20 inches is left between them. This litter may be turned over before being used, and especially with narrow blankets or rugs it is much safer to bind them to the poles with twine. With both these stretchers, it is desirable, when possible, to tie on two pieces of wood for cross-pieces so as to prevent the poles from approaching each other when the weight of the patient is put on the stretcher.

Instead of rugs and blankets, bags and sacks may be employed for litter beds. The bottoms of the latter should be ripped so that the poles may be passed through the number sufficient to give the length of litter required.

With these and similar stretchers, careful tests should be made before allowing them to be used for patients; care is also necessary to guard against accidents during transportation. Numbers of articles, some of which may almost always be easily procured, may also be used for litters in case of necessity. Such articles are doors, window shutters, boards, bed frames, benches, ladders, mattresses, rugs, blankets and mats.

1. Carrying

First, carrying by stretcher will be discussed, and afterwards, carrying without a stretcher.

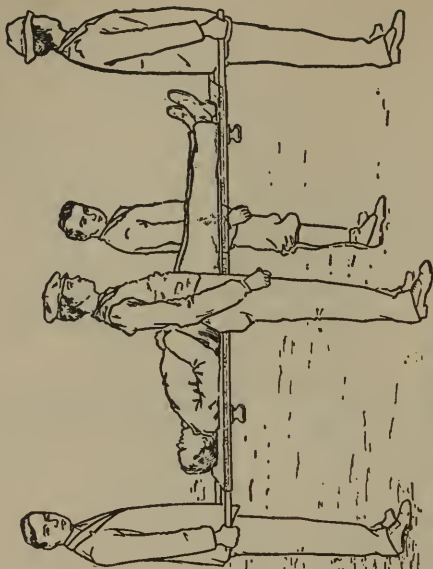
Whatever the kind of stretcher used, the greatest gentleness should be employed in putting the patient on it, in carrying it, and in removing the patient when he has reached his destination. To effect this the bearers must work together in all these movements.

Four bearers are required, though but two do the actual carrying. For them select strong, sturdy men of about equal height. They should be intelligent in order that they may under-



1. Loading Patients on Stretcher

(Note all bearers kneel on knee nearest injured man's feet)



2. Carrying Patient on Stretcher

stand your directions. Don't be afraid of spending a little time in explaining just what you want done, you will save in the end. First have one of the bearers bring the stretcher close to the patient but not so near that it will interfere with lifting him. The most convenient place for the stretcher will be about 2 feet from the patient's head in line with the body. Then have three bearers take position on one side of the patient and one on the other side. If the patient is not on his back the single bearer should be directed to put him in that position. Of course, it is understood that first-aid treatment has already been given. The proper places for the bearers are, the single bearer opposite the patient's hips, one of those on the other side also at the hips between the other two, one at the shoulder and one at the knees. At this time it will be well to explain no movements are ever to be made until you give the word. Now, have all four bearers facing the patient kneel on the knees nearest the patient's feet. Have the single bearer and the man opposite him pass their arms under the patient's back and thighs, the man at the shoulder puts one arm under the patient's shoulders and the other under his neck to the farther shoulder so as to support the head, at the same time the man at the knees places both arms under the legs. Ask the bearers if they are ready and then say "Lift." Then the bearers must all lift together and place the patient on the knees of the three bearers who are in line. These, of course, form a firm bench. As soon as the patient is safely in position, the single bearer should be told to leave him and to get the stretcher and put it under him against the other bearers' ankles. The single bearer should then put his arms under the patient's back and thighs as before. Ask again if the bearers are ready and give the word "Lower." The patient is then gently lowered to the stretcher.

Next, have one bearer take position between the stretcher handles at the front and another at the rear. Direct them to stoop and to take hold of the handles but not to lift until you give the word "Lift." Then they rise and stand erect. They should not move forward, however, till the word "March" is given. Then the one at the front steps off with his left foot and the bearer

at the rear with his right foot so as to break step. This will jolt the stretcher much less than though the bearers are in step and if they take short steps instead of long ones this will help in the same way. Always carry the patient feet first except when going up a hill or upstairs when he should be carried head first, the stretcher being kept as level as possible. The two bearers who are not carrying the stretcher march at its sides to give any needed assistance and, of course, finally to help remove the patient. The motions are reversed in removing a patient from a stretcher.

When four bearers must be employed everything is done in the same way except that four instead of two men carry the stretcher.

Generally speaking, the bearers should take the shortest course in carrying the patient to his destination, but it is much better to go around all obstacles than over them as this will jolt the patient less.

Explain to the bearers further that you will tell them where you wish them to stop; but after doing this they are not to lower the stretcher until you give the word "Lower." Then the stretcher should be gently lowered to the ground.

As explained above, in carrying a patient upstairs or uphill he should go head and not feet first. To do this without confusion it will be best to stop the stretcher at the foot of the hill or of the stairs, as the case may be, and to lower it to the ground. Then have the bearers face in the opposite direction, lift the stretcher, turn it around slowly and then go up the hill or stairs.

Of course, the position of the patient on the stretcher should be such that his particular injury will receive no further hurt. Usually it will be best to make a pillow from a folded coat but if the patient is very faint or has lost a great deal of blood he is safer without the pillow.

A convenient method of carrying a patient without a stretcher is to seat her, and this is particularly well adapted for women, in a strong chair and have two bearers lift the chair, one at the front and the other at the rear. The chair should be inclined backward so that the patient is almost in the lying-down position.

By one bearer

A single bearer may carry a patient in his arms or on his back.

1. In arms

The bearer, after turning patient on his face, steps astride his body, facing toward the patient's head, and with hands under his armpits lifts him to his knees; then clasping hands over abdomen, lifts him to his feet; he then with his left hand seizes the patient by the left wrist and draws left arm around



1. Lifted erect.



2. In arms.

his (the bearer's) neck and holds it against his left chest, the patient's left side resting against his body, and supports him, with his right arm about the waist.

From this position the bearer, with his right arm upon the patient's back, passes his left under thighs and lifts him into position, carrying him well up.

2. Across back

The patient is first lifted erect as described in previous paragraph, when the bearer with his left hand seizes the right wrist of the patient and draws the arm over the head and down upon his left shoulder, then shifting himself in front, stoops and clasps the right thigh with his right arm passed between the legs, his right hand seizing the patient's right wrist; lastly the bearer with his left hand grasps the patient's left and steadies it against his side, when he rises.



3. Across back.



4. Astride of back.

3. Astride of back

The patient is lifted erect (as described), when the bearer shifts himself to the front of the patient, back to patient, stoops and grasping his thighs, brings him well upon his back.

As the patient must help himself by placing his arms around the bearer's neck, this method is impracticable with an unconscious man.

In lowering the patient from these positions the motions are reversed. Should the patient be injured in such a manner as to require these motions to be conducted from the right side instead of left, as laid down, the change is simply one of hands—the motions proceed as directed, substituting right for left and *vice versa*.

By two bearers

One bearer takes position between the patient's legs and the other at his head, both facing toward his feet. They then lift him as shown.



5. By two bearers.

2. Lifting into Bed

It is somewhat easier to do this with a narrow bed as with this bearers can work on both sides in lifting, carrying, and lowering the patient. With a narrow bed have the loaded stretcher, patient carried head first, brought to the foot of the bed and in line with it. Then have the bearers raise the patient on their knees just as though they were going to lower him to the ground.

After the single bearer has removed the stretcher he will return to assist with the patient. When his arms are in position to do this, the word "Rise" should be given, then the bearers all supporting the patient will rise to their feet and carry the patient to the bed, side stepping on each side, thus passing the patient over the foot-board. When in proper position the patient should be gently lowered to the bed and the bearers remove their arms.

If the bed is too wide for this method to be adopted or if there is not space to place the stretcher in line with the bed at its foot a slightly different plan must be followed. For this the loaded stretcher is placed at the side of the bed and the patient is raised in exactly the same way, the stretcher, of course, being taken out of the way. After the single bearer has assisted in raising the patient, however, he steps to one side and the other three bearers carry the patient forward over the side of the bed.

A patient carried, without a stretcher, by one or two bearers should be gently lowered to the bed, the motions for lifting being reversed.

QUESTIONS

1. Show what you would do and say if you were called upon to direct four men to carry an injured person on a stretcher.
2. How would you have an injured person carried upstairs?
3. How should a person be lifted from a stretcher to a bed?

PRACTICAL EXERCISES

Practice in carrying a patient. This may easily be actually done if you have a light boy for a subject, but in any event the necessary motions may be satisfactorily demonstrated. When practical lifting the patient into the bed should also be demonstrated.

The best exercise will be to describe some injury and to tell the members of the class to do everything necessary till the patient is in bed.

CHAPTER XIV

WAR FIRST AID

1. WAR INJURIES. 2. ORGANIZATION OF AID TO WOUNDED. 3. AID FROM FRONT TO REAR. 4. FIRST AID LESSONS.

The World War differs in many respects from any war previously waged, but in none perhaps more than in the great number of new agents used to injure and defeat the enemy. In former modern wars, provision had to be made to care for wounds produced in the main by rifle bullets, comparatively few from artillery and a still smaller number from cutting weapons, such as bayonets, sabres and swords. Now, artillery has enormously increased in importance, and high explosives are used in many new forms. Wounds from cutting weapons of different kinds are a common incident of trench warfare, and deadly gases have for the first time assumed a terrible and sinister significance. Liquid fire and boiling oil, too, have found a place. Then, again, the strain of a new warfare is terrific, resulting in many becoming disabled from shell shock and the like.

But, if on the one hand the destructiveness of war has increased, on the other, never have wounded been cared for so well. It is my purpose, in the present chapter, to describe in some detail the wounds received, and their care and treatment. This will go a bit outside of First Aid in some respects, it is true, but in view of the importance of the subject to all, and the special interest which every first aider must have in it, no apology is necessary, nor will it be offered.

1. War Injuries

Wounds from rifles still constitute a large percentage of the total number of wounds. It has been stated that such wounds

amount to about 40 per cent. of the total number, but this varies considerably under different circumstances. The modern rifle is of small calibre, that is to say the bullet from it is a small bullet so far as its face is concerned, therefore the injuries produced in the human body are limited to a small area. This is ordinarily the case, but at very close range, on account of the rapidity of the spin of the modern rifle bullet, it produces almost explosive effect with considerable destruction of the body tissue, and at long ranges, as the bullet is very long, on account of its wobbling it also causes more injury than in the middle of its flight. Artillery projectiles are divided into two classes, shrapnel shells and explosive shells. The former contain a large number of lead bullets much bigger than the rifle bullet. These are expelled from the shell when it explodes, and on account of their larger size, naturally produce much more severe injuries than the rifle bullet. When an explosive shell bursts, the pieces of the shell, and also frequently objects which the shell strikes are hurled in every direction. Hand grenades cause injuries very similar to those produced by explosive shells. Bombs dropped from aeroplanes also have the same effect as explosive shells. Now, to go into the wounds caused by these various projectiles a little more fully. The rifle bullet at mid ranges, as stated, is not very destructive, so wounds from it are the least dangerous we encounter. While neither at near ranges nor at far ranges does the rifle bullet destroy as much tissue as the artillery projectiles, yet, as already explained, more injury is produced than is the case when one is wounded in the middle of its flight. With shrapnel, and more especially with explosive shell, the tissues of the body are often torn away in great part. As such destruction may involve blood-vessels, nerves and brain, or chest or abdomen, death frequently results at once. The outstanding fact regarding the majority of wounds in the present war has, however, been that on account of the very great destruction of the body tissue, not only in the track of the projectile, but around it, the wounds become very seriously infected, so even when the immediate effect is recovered from, wounded are face to face with the serious dangers of severely infected wounds which have

already been discussed in the body of the book. This may mean suppuration from a long time, with more or less blood poisoning, and afterward large scars which may seriously interfere with the motion of the muscles, and so have a serious crippling effect.

As explained, infection of wounds has been their main characteristic in the World War. This has been occasioned in part, too, by the conditions under which the war has been fought. In the trenches it is impossible for men to keep clean. So when wounds are received, dirty clothing and dirty skin driven into them much increase the chances of infection. Then, too, much of the war has been fought over the highly fertilized fields of Belgium and France. In such soils, the germs of tetanus are always found, so this danger has also been added. Gas gangrene, a condition which is so uncommon in civil life that it has not been considered in the body of the book, has also been characteristic of many wounds. Both of these severe conditions are, happily, now much better understood, and so better controlled than they were at the beginning of the war.

From what has been said, it should be apparent that the greater part of the surgical work in the World War has been to diminish, and, to control the infection of wounds. This has been accomplished by prompt rescue and first aid, and by getting the wounded into skilled surgical hands as promptly as possible. Moreover, many new surgical procedures have been evolved as the result of the great experience in preventing infection, and in treating infected wounds during this war.

Like procedures have been adopted so far as wounds caused by cutting weapons are concerned, for these, too, have been very generally infected.

As the war has gone on, the chemists of the various combatants have invented and adapted for war use more and more deadly gases. At first, such gases were mainly used in cylinders. These cylinders were put on the parapets of the trenches, a cloud of gas being liberated when the wind was favorable, so that it would roll over the enemies' trenches close to the ground, suffocating or half suffocating the enemies' troops in its course. It was found, however, that much more effective and deadly

results could be secured by shells containing a liquid which on explosion would evolve a gas. These shells can, of course, be fired to a considerable distance, thus effecting injury, not only on the enemy at the front, but also far back.

Chlorine was the chemical mainly used at first. Early, too, besides this suffocating gas, the so-called tear gases were employed. These, not nearly so deadly as chlorine have for their special object irritation of the eyes of the troops, especially of the artillery, so they will not be able to see to shoot.

From week to week more and more deadly gases have come into use, so what is written today about gas warfare may not be true tomorrow. At the present writing the gas most discussed is mustard gas. This burns the skin as well as injures the lungs when inhaled, though it does not produce as prompt and severe action in the latter respect, as do gases of the chlorine type which may kill at once, through the extreme irritation, which causes swelling of the upper part of the throat, and so suffocation, or later, through inflammation of the lungs.

The prevention of injury from all these gases is afforded by gas masks which all troops and their transport animals as well are required to wear during a gas attack. A part of the military training of troops is the use of gas masks which they are drilled to put on as soon as an alarm is received, safety being a matter of seconds, sometimes. Carelessness in this matter is always dangerous, for while with some of the gases bad results are not apparent at first it has been found that men fall dead later. The body is protected from the burning of mustard gas by clothing.

The treatment of the gassed is not a first aid subject, except that it is to be remembered anyone gassed may be in a dangerous condition, even if this is not apparent, and he should be examined by a doctor as soon as possible. Moreover, till he is, he ought not subject his heart to strain by exertion. If he can be kept absolutely quiet in a lying down position, so much the safer.

The burns due to liquid flame or to boiling oil are like those of other severe burns, and their treatment is the same. As men-

tioned elsewhere, Ambrine is a product of the war, and as also stated elsewhere, it is of value.

Shell shock is a very important subject in itself, on which reams have already been written. It is entirely too complicated a one to be discussed here more than very briefly. Shell shock, as its name indicates, is a form of shock, but it partakes more of the nature of a mental rather than a physical shock. Applying the name shell to this kind of shock, while convenient, is not exact. That is to say, the cause is rarely, if ever, the explosion of a single shell, but rather is due to the effect on the brain caused by strain incident to intensive trench warfare.

Besides the injuries which have been described, accidents in an army at war are much commoner than with a like number of men in peace times, and with the millions of men who have been engaged in the World War, there have been hundreds of thousands of accidents. Their treatment in nowise differs from similar accidents in peace, and first aid for them has already been given in the text.

In addition to the injuries which have demanded care in the field of battle, home territory has been subjected to certain injuries due to the state of war.

Special reference in this connection should be made to munition factories. Poisoning has not been uncommon, due to handling high explosives in the course of manufacture. T.N.T. is one of the newer explosives largely used and workmen and workwomen often suffer from its fumes.

A still more remote, though none the less important, condition due to the war has been the depletion of the ranks of doctors and nurses in the warring countries. So many have been taken for the Army and Navy that in many communities prompt medical service is no longer procurable. We have to date suffered less in this direction than has been the case with our Allies; but we have not been at war so long, nor has the war yet made such inroads on us. Worse conditions in this respect must be expected for the future. This will make knowledge of first aid and home nursing not only more important, but actually indispensable, if

suffering and further injury is to be prevented until the belated and overworked doctor can arrive on the scene.

2. Organization of Aid to Wounded

It is not generally appreciated what a vast business aid to injured in war is. The usual estimate is that 10 per cent. of an army at war must consist of medical personnel. This means that in an army of two million at war, two hundred thousand will be required to care for ill and injured. A higher percentage would be required in modern warfare were it not for the fact that modern scientific methods have much reduced the sick in armies. For us, it should be remembered, though, that our soldiers are fighting thousands of miles from home, and with the extra time necessary for transportation to and fro, the estimate of 10 per cent. is likely to prove a good deal too small. Then, too, as we contemplate the regeneration and restoration of our wounded, and, therefore, they will not be discharged till this is finally accomplished, considerable additional medical personnel will be required for this.

The term medical personnel is a convenient one to use, but it should be understood that under this term is included not only doctors, but also everybody else concerned in the care of sick and wounded, their transportation and medical supplies. As a matter of fact only 10 per cent. of the medical personnel consists of doctors. The other 90 per cent. is made up of sanitary officers, dentists, hospital corps, nurses and their assistants, and a certain number of civilian employees

This personnel comes from both the medical department of the Army and the Red Cross. Before the war our Red Cross was very active in organizing Base Hospitals, as well as, of course, in many other directions, looking to preparation for the care of our sick and wounded soldiers and sailors. Our Red Cross, too, was very successful before this war in organizing the nursing profession of the country.

During a war, however, the Army Medical Department and the Red Cross, or the Navy Medical Department, as the case may be, operates as one body. That is to say, in both our land and

sea forces there is only one organization, so far as each is concerned, which is held responsible for the care of sick and wounded. Depending on whether the Army or the Navy is concerned, the Red Cross is merged into one or the other of these organizations. The higher administration is quite another matter. This is separate for the Army and for the Navy, and the Red Cross maintains its own higher administrative staff. Close cooperation is established, however, in order that there may be no overlapping of effort, and no duplication or lack at some point.

The organization of the medical department of an army at war is very complicated, not less so than that of the army itself, for, of course, the needs of all the organizations of the army must be provided for from the front line to home territory.

There are three zones as they are called, in an army at war, the zone of the front, that of the lines of communication with its base of operations, and home territory. Besides in the present war, we have the wide sea zone between home territory and the base or bases of operation abroad.

At the front are found the medical organization with regiments and other fighting units. Of course, all units have their medical personnel wherever they may be and this always accompanies them, but just at present we are speaking of the front. This medical personnel establishes a dressing station in the front line trenches. Here, except in combat, most of the regimental medical personnel, consisting of medical officers and men, is found. Usually, there is one of these advanced dressing stations to a battalion. When possible, the advanced dressing station is bomb-proofed. From it part of the medical personnel goes over the top, when necessary to rescue wounded, and it is here that a very large percentage of the casualties among the medical personnel occur, they being no more protected from fire than the armed troops. A few hundred yards farther back is the main dressing station established also in a bomb proof. The personnel for this also consists of medical officers and men. Next on the way to the rear is found the field hospital, four or five miles from the front. Wounded are carried to the advanced dressing station by the battalion personnel, but their further

transportation in the zone of the front is usually performed by the ambulance company. These companies are provided with both animal and motor transport; the former being used only when motors cannot be employed, and especially at the front.

On our way to the rear, we now come to the beginning of the lines of communication. Here at the end of the railroad is found the first real hospital. For this we use an evacuation hospital; the British call this the Casualty Clearing Station. In this advanced evacuation hospital are found not only medical officers and men but also nurses. Our evacuation hospitals are large and rather elaborate establishments, and hundreds of patients pass through these institutions daily during active times at the front. From these, wounded are evacuated still farther to the rear, usually by train, but sometimes by boat, or in default of either, by motor. The next stopping place of seriously wounded is another evacuation hospital or a base hospital. These, originally designed for 500 patients, have constantly grown larger and larger till some of them can accommodate one, two, three thousand or even more patients.

As the war has gone on, it has been found desirable to assemble different classes of wounded in special hospitals at the base, and this has led to many more hospitals being established, which have the general character of base hospitals but which only take certain wounds, such as wounds of the eye, the head, the abdomen, etc., etc.

Our next stage is overseas home for those wounded which cannot be cured abroad. From the ship on arrival in the home land, they are received in the ports of embarkation hospitals and are thence distributed to hospitals specially organized to care for different classes of wounds. It is intended, so far as possible, that wounded shall ultimately reach hospitals in their own part of the country. We have, of course, hospital trains at home as well as abroad.

The plan is to provide hospital accommodations for 20 per cent. of our troops, and it is a matter of common knowledge that our most distinguished surgeons and physicians have responded freely to their country's calls, and can now be found in the

commissioned ranks of the medical department of either Army or Navy.

In the latter, the medical organization, while equally essential, is much less complicated. First aid is given on the fighting ships themselves; hospital care and transportation is provided on hospital ships, and the home hospitals are much the same as the Army hospitals, though their total bed capacity is less, as so many wounded do not have to be provided for in the Navy.

The Red Cross organized base hospitals for the Navy as well as the Army before the war. The former were organized to care for 250 patients instead of the 500 of the Red Cross Army base hospitals. Both, of course, are capable of expansion.

3. Aid From Front to Rear

As practically all wounds are contaminated, except some rifle bullet wounds, urgent and energetic treatment is demanded, so the wounded man should be sent back as soon as possible to a place where disinfection of the wound can be effectively carried out. In periods when attacks are not going on, this is comparatively simple, but when an offensive or a counter offensive is in progress, on account of the heavy fire and the heavy losses, with often difficult ground, the task of the medical department becomes enormously difficult.

The duties of the medical department at the front may be separated as follows:

1. To rescue the wounded man as quickly as possible and to carry him to a comparatively safe place.
2. If he can be carried further, to send him back to a hospital after dressing his wound and splinting any fracture he may have sustained.
3. To give necessary attention in a dressing station for a few hours to wounded severely shocked, or who, for some other reason, it is unsafe to transport.
4. To carry out proper emergency treatment of wounds which cannot be delayed. This consists in great part in checking bleeding.

During the comparatively quiet periods, between attacks, wounds naturally are received by the officers and soldiers manning the trenches. The first problem in their case, then, is to get them to a dressing station. As they must be carried along a trench, and often a very narrow trench with sharp angles, the ordinary litter will not answer the purpose, as it is too long to make the turns, so a shorter litter is used in which the wounded man is carried in a sitting position.

In an attack or counter attack, the majority of wounds are received, of course, in the open field, and not in the trenches. The bearers who rescue the wounded are medical department men under command of a medical officer. They come from a dressing station and do their work without shelter under either artillery fire or rifle fire, or perhaps both. Rescue under artillery fire is best done during the day. The bearers can tell more about the enemy's zone of fire then and can often get a little shelter from inequalities in the ground and at the same time dodge bad ground while carrying the wounded. Rifle fire is quite another matter. In it, by day, bearers cannot work within 1300 to 1600 yards of the enemy's line. So exposed to infantry fire they have to rescue wounded at night. Of course, all wounded who can walk must do so. All men who must be carried are taken to the nearest shelter to be transported to the dressing station later. This frees the bearers promptly, so they may go after more wounded.

On the field of battle, besides rescuing the wounded, the bearers are often compelled to check bleeding, otherwise they would find a dead, and not a wounded, man on their hands. When a tourniquet is not available, this must be done by a belt, shoe lace, strap or a bandage. Another very important thing to do on the battle field is to care for fractures. Material for splints is often not at hand, so fractures of the upper limbs are splinted by fixing the wounded limb to the chest by a few turns of a bandage. As noted elsewhere, when one lower limb is broken, its fellow may be used as a splint by bandaging the legs together. When both legs are broken, a rifle or stake is placed between them and a bandage is carried about the whole bundle.

Each officer and soldier carries a first aid packet as part of his equipment and this is promptly applied to any wound he may receive.

A common practice, too, is to give morphine, camphorated oil or a swallow of tea or coffee. This lessens pain, stimulates, and decreases shock.

The advanced dressing stations are only intended to offer the most urgent attention to wounded. In them one or two medical officers are found, with a very simple equipment. The main dressing stations are usually big enough to shelter 20 or 30 wounded and have facilities to care for the more severely wounded for several hours, if need be. They have a fairly good equipment, consisting of litters, blankets, dressings, splints, instruments, food, water and drugs, including antitetanic serum. On account of the danger of lockjaw, it has been found necessary to give this serum as far to the front as this. At least two medical officers are found here with a couple of medical department noncommissioned officers, and a few men.

The treatment given wounded at the dressing station is of extreme importance, as their future is largely dependent on what is done or is not done there. It is mainly first aid pure and simple, so from what has just been said one can readily appreciate how important first aid is in war.

The work of the dressing station will be considered under the following heads:

1. Infection. 2. Shock. 3. Hemorrhage. 4. Fractures. 5. Wounds of the Chest. 6. Wounds of the Skull. 7. Wounds of the Abdomen.

Infection.—It is very important to remember that after the receipt of a wound, there is an interval of from 9 to 12 hours before infection develops, therefore, it is essential, to prevent infection, that the wound be disinfected before this time elapses. Iodine has been found very valuable for this purpose in many of the wounds received in civil life; but in the World War, the promises that iodine held out have not been fulfilled. This is because it is impossible in the majority of war wounds to apply iodine so it will reach all the recesses of the wound. Moreover,

the destruction of tissue is so great in many of these wounds that a considerable amount of tissue around the wound must be removed or infection will inevitably occur. Iodine is, however, used in some of the armies, and does prevent infection, but only in a comparatively few wounds. The plan that must be adopted, then, is to get wounded back from the dressing station to a point where proper facilities are afforded for disinfecting the wounds, and this is always the practice so far as it can be carried out. The necessity of giving the antitetanic serum at the dressing station to prevent tetanus has already been explained.

Shock.—It has been found difficult to distinguish between shock and hemorrhage, and great care must be taken with the shocked to discover if bleeding is not still going on. We have no drug, unfortunately, which will cure shock. The measures taken have for their object the prevention of chilling of the body and restoration of the tension of the arteries. For the former, the limbs of the patients are covered with cotton batting, and their bodies are surrounded by hot-water bottles. An ingenious apparatus has been improvised in some dressing stations by which hot air from a lamp is carried under the patient's blankets through a stove pipe. To raise the arterial pressure, the wounded man is placed with his head low and his feet elevated. The surgeons also inject camphorated oil every two hours and give normal saline solution. Wounded with severe shock, unless they have abdominal wounds which always need immediate attention, are kept at a dressing station, if possible, till their condition improves, say, from 12 to 24 hours.

Hemorrhage.—A tourniquet is used, but only for bleeding in jets, that is arterial hemorrhage; it should never be used without a pad which rests on the artery and is always dangerous unless its use is carefully regulated. In place of it, surgeons often clamp the artery with an artery forcep and sometimes leave this in place, and sometimes tie the artery. Unless absolutely necessary, wounded should not be sent to the rear with a tourniquet in place, and if this has to be done an entry should be made to this effect on the diagnosis card which accompanies every patient. It has been found, however, as is always the case, the tourniquet

is better than a strap which presses on the whole limb. The tourniquet is of no use for oozing hemorrhage. This must be controlled by the pressure of the dressing bandaged firmly in place.

Fractures.—Something has already been said about the necessity for splinting fractures on the field of battle. Little need be added to this here except it is obvious that more care can be taken in dressing stations than on the battle field to do careful splinting. Splints should always be long enough to prevent movement of the joints about and below the fracture. The ordinary window blind which rolls up has been found a good material for splints. It usually can be easily found in the battle area.

Wounds of the Chest.—Such wounds are sent from the dressing station to the rear as promptly as possible after a tight bandage is put around the chest to prevent movement. A folded blanket is also put under the shoulders during transportation, as it has been found this prevents coughing, and possibly further bleeding. Morphine is also given to check bleeding from chest wounds.

Wounds of the Skull.—These are sent back from dressing stations as promptly as possible. A dressing is applied, but nothing more is done except sometimes the hair is shaved around the wound, and the scalp is cleaned.

Wounds of the Abdomen.—Patients with such wounds are sent to the rear immediately, as their only safety lies in getting them where they can receive skilled surgical attention at once.

While transportation in the zone in advance of the dressing station, and to that station is practically always by hand litter, in rear thereof wheeled transport is almost exclusively used.

From the dressing station, as has been previously explained, wounded are taken, or walk back to the field hospital perhaps, but almost always to the advanced evacuation hospital. The object is to get wounded as quickly as possible to a place where facilities are afforded properly to clean and disinfect their wounds, and to give them other attention requiring both good surgical equipment and a highly skilled staff. This is the advanced evacuation hospital.

On arrival here, wounded are in a new world. They have left behind the dirt, confusion, exposure and dangers of the battle to enter what is in comparison a haven of rest. Here they are cared for by the most skillful surgeons and nurses. Many of these hospitals are better staffed than is the case in any of our civil hospitals. Very often these hospitals work in pairs, one taking all patients till it is filled up, then the other doing the same thing, the former being cleared so when the latter is filled it can start anew.

Just how long wounded remain in the advanced evacuation hospitals depends upon circumstances. The plan is to retain them till it is safe to move them further to the rear, but no longer, for their places will be required for on-coming wounded.

We have now left the domain of first aid and it would hardly be appropriate in a book of this character to discuss the hospital care of wounded, which is, of course, solely involved in their future journey from front to rear.

A few words should be said here, however, on the extreme complexity of the measures which it has been found necessary to take to disinfect the many severely infected wounds of the World War. Unfortunately, we have no antiseptic which, by simple application to these severely infected wounds, will disinfect them. The procedure which has been found most effective was studied out by Dr. Carrel. This consists essentially of removal of the tissue destroyed and disorganized by the projectile, with closure, by sewing it together, of the wound. The wound is not so closed however, till it is freed of pus germs. A mild antiseptic solution is used for this purpose. It is called the Carrel-Dakin solution, though it has been modified by investigators other than Dakin, and their names are given to the solutions for which they are responsible. Chlorine is the disinfecting agent, but a solution must be made which, while containing this chemical in sufficient quantity to disinfect, is at the same time not irritating. This is a difficult chemical problem. This solution, too, has to be fresh, for it will not keep. After using the solution for a few hours or days, and for this, too, a special apparatus is necessary, the wound is examined to see if

it contains pus germs. As soon as it is practically free from them, it is sewed up. From what has been said it should be apparent that the procedures described not only requires high surgical skill but a knowledge of chemistry and bacteriology with considerable mechanical ability. Of course, this procedure is not for the first aider, nor for the ordinary surgeon; as a matter of fact, Dr. Carrel says a month or six weeks is required to teach it to the competent surgeon.

In closing this section of the subject, you should not carry away too gloomy a picture. If on the one hand the wounds of the World War have been very severe, on the other hand, never in war have wounds been as well treated, so the net result is that never in any war have so large a percentage been cured. Without, in any way, intending to minimize the sacrifices of wounded, attention should be invited to the fact that shock fortunately is merciful. Morphine is also given freely to wounded and this helps a great deal not only in diminishing suffering, but also in lessening shock.

4. First Aid Lessons

The one lesson which stands out above all others is that the only way to prevent infection of wounds of the character of the majority of those received in the World War, is that they should be gotten into the hands of a doctor as promptly as possible. It will be noted that the fact has been mentioned that there is a free period of from 9 to 12 hours before infection gets a start beyond prompt control. Now exactly the same thing is true for similar wounds in civil life. The commonest such wounds then are those produced by machinery, though all wounds, when there is similar extensive injury of the tissue of the body, are quite the same. The first aider should, of course, give proper emergency treatment to these wounds, but he should also hurry them into the hands of a doctor.

Mention has been made of the fact that it has been found necessary in the war to establish a great number of special hospitals for different classes of wounds. There is a further

lesson in this, and that is that highly technical and special skill is necessary in order to treat wounds successfully.

It is hardly conceivable that any first aider who has studied this book will think he has this skill, but we do sometimes see people caring for wounds in the most complacent way, which no one but a doctor ought to touch, except in the way of strictly first aid treatment.

So good has the transportation of wounded been in the war that it has been well said that never again will we be content in our cities with anything except rapid motor transport, so that ill and injured may be hurried to a hospital.

Iodine has been a disappointment, but this does not mean it is without value. On the contrary, promptly applied to any wound in which it can reach the whole wounded surface, it will prevent infection in many instances. In the ordinary wound, while it will not, of course, prevent the infection of surfaces it does not reach, by preventing infection of a great part of the wound, it helps a great deal. Better always use it if you have it, remembering, however, that the value of a clean dressing without iodine is not to be despised.

The treatment of shock has not been wholly satisfactory; it never is, but a great deal has been accomplished by the simple measures described as in use at dressing stations.

It should be noted that it has been found unsafe to transport the severely shocked till they have reacted. The danger of overlooking severe bleeding in shock is noteworthy, just as is the case in civil life.

While it should be apparent that there is nothing in War First Aid that the careful student of this book is not well prepared to do, consider for the moment the conditions under which this work has actually been done. Lacking the stimulus of combat, the medical officers and soldiers have gone fearlessly to all parts of the battle fields where they could rescue and care for wounded. Their losses have been very heavy in the performance of their humane mission. Is it not true that our country owes them a deep debt of gratitude? Not more than our other soldiers, of course, but certainly just as much.

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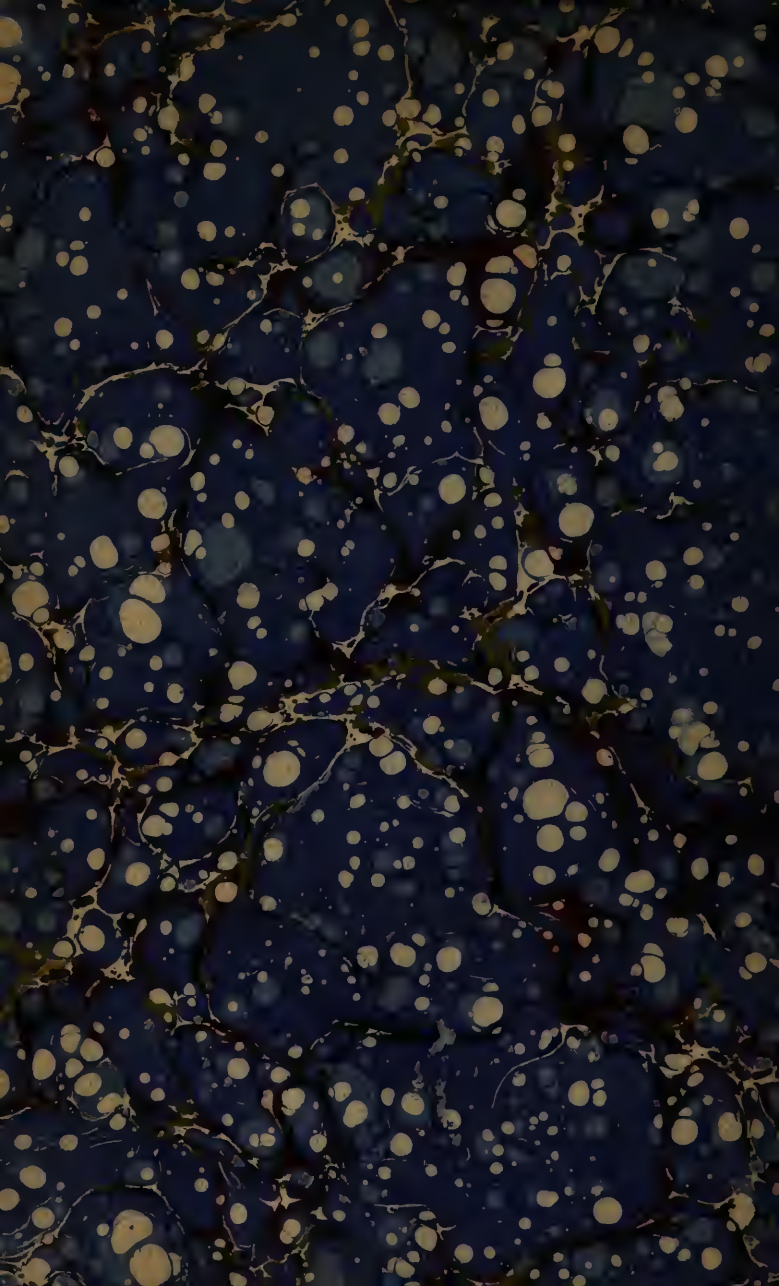
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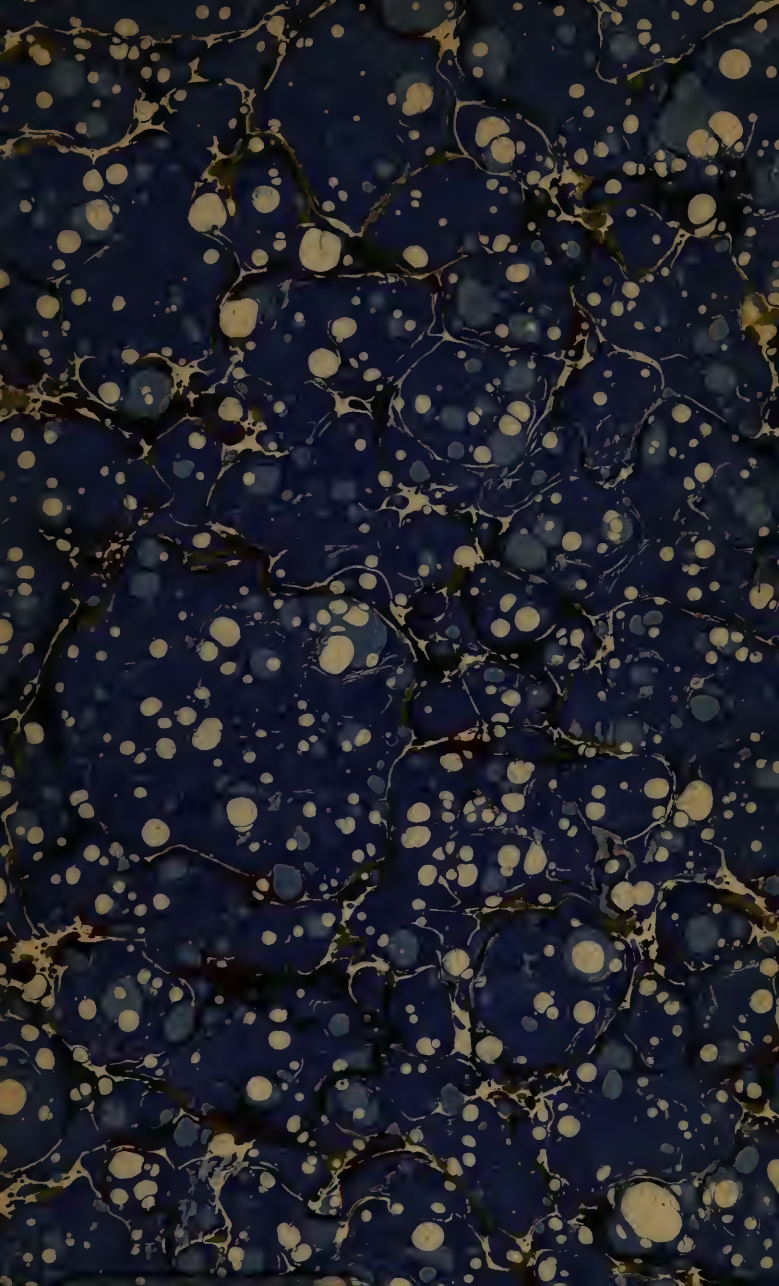
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